CONSOLIDATION OF EMISSIONS INVENTORIES
(SCHEDULE 9; WORK ITEM 3)

FINAL

Prepared by
E.H. Pechan & Associates, Inc.
3622 Lyckan Parkway, Suite 2002
Durham, NC 27707

and

Carolina Environmental Program
CB# 1105, 100 Miller Hall, UNC-Chapel Hill
Chapel Hill, NC 27599-1105

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for the
Central Regional Air Planning Association (CENRAP)
10005 S. Pennsylvania, Suite C
Oklahoma City, OK 73159

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ACRONYMS AND ABBREVIATIONS

BRAVO	Big Bend Regional Aerosol and Visibility Observational
CAFO	Concentrated Animal Feeding Operations
CAP	criteria air pollutant
CE	Control Equipment (NIF 3.0 table)
CEM	Continuous Emissions Monitoring
CENRAP	Central Regional Air Planning Association
CERR	Consolidated Emissions Reporting Rule
CMU	Carnegie Mellon University
CO	carbon monoxide
CO_2	carbon dioxide
CH_4	methane
CMV	commercial marine vessel
CVS	Concurrent Versions System
EC	elemental carbon
EFIG	Emission Factor and Inventory Group
EI	Emission Inventory
EM	Emission (NIF 3.0 table)
EP	Emission Process (NIF 3.0 table)
EPA	U.S. Environmental Protection Agency
EPS	Emissions Preprocessor System
ER	Emission Release Point (NIF 3.0 table)
ERG	Eastern Research Group
ERP	Emission Release Point (NIF 3.0 field in ER table)
EU	Emission Unit (NIF 3.0 table)
FIPS	Federal Information Processing Standard
FIRE	Factor Information and REtrieval
GIS	geographic information system
GWEI	Gulfwide Emissions Inventory
HAP	hazardous air pollutant
ID	identification
IDA	Inventory Data Analyzer format
LPG	liquefied petroleum gas
MACT	maximum achievable control technology
MANE-VU	Mid-Atlantic/Northeast Visibility Union
MMS	Minerals Management Services
NAAQS	National Ambient Air Quality Standard
NAICS	North American Industrial Classification System
NEI	National Emissions Inventory
NH_3	ammonia
NIF 3.0	NEI Input Format Version 3.0
NO_x	oxides of nitrogen
OC	organic carbon
ORIS	Office of Regulatory Information Systems
PD	primary device
PE	Emission Period (NIF 3.0 table)
Pechan	E.H. Pechan & Associates, Inc.

PM	total particulate matter
PM_{10}	particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers
PM10-FIL	filterable PM_{10}
PM10-PRI	primary PM_{10}
$PM_{2.5}$	particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers
PM25-FIL	filterable $PM_{2.5}$
PM25-PRI	primary $PM_{2.5}$
PM-CON	condensible PM
QA	quality assurance
QAPP	Quality Assurance Project Plan
RPO	Regional Planning Organization
SCC	Source Classification Code
SD	secondary device
SI	Site (NIF 3.0 table)
SIC	Standard Industrial Classification
SIP	State Implementation Plan
S/L/T	State, Local, and Tribal
SMOKE	Sparse Matrix Operator Kernel Emissions
SO_2	sulfur dioxide
TCEQ	Texas Commission on Environmental Quality
TR	Transmittal (NIF 3.0 table)
UCAR	University of California, Riverside
UNC-CEP	University of North Carolina, Chapel Hill – Carolina Environmental Program
U.S.	United States
VISTAS	Visibility Improvement State and Tribal Association of the Southeast
VOC	volatile organic compound
WRAP	Western Regional Air Partnership

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I.   INTRODUCTION

A.   Overview

This report documents the data sources, methods, and results for preparing the 2002 base year criteria air pollutant (CAP) and ammonia (NH_3) emissions inventories for point, area, and nonroad sources for the Central Regional Air Planning Association (CENRAP) Regional Planning Organization (RPO). The CENRAP region includes the states and tribal jurisdictions of Arkansas, Iowa, Kansas, Louisiana, Minnesota, Missouri, Nebraska, Oklahoma, and Texas. CENRAP (and other RPOs) will use these inventories to support air quality modeling, State Implementation Plan (SIP) development, and implementation activities for the regional haze rule and fine PM and ozone National Ambient Air Quality Standards (NAAQS).

The inventories and supporting data prepared include the following:

(1)   Comprehensive, county-level, mass emissions and modeling inventories for point, area, and nonroad sources of 2002 emissions for the CAPs and NH_3 for the State, Local, and Tribal (S/L/T) agencies included in the CENRAP region;

(2)   The temporal, speciation, and spatial allocation profiles for the CENRAP region inventories; and

(3)   Inventories for other RPOs, Canada, and Mexico.

The mass emissions inventory files were prepared in the National Emissions Inventory (NEI) Input Format Version 3.0 (NIF 3.0). The modeling inventory files were prepared in the Sparse Matrix Operator Kernel Emissions/Inventory Data Analyzer (SMOKE/IDA) format. Ancillary files (holding spatial, temporal, and speciation profile data) were prepared in SMOKE/IDA compatible format.

The inventories include annual emissions for sulfur dioxide (SO_2), oxides of nitrogen (NO_x), volatile organic compounds (VOC), carbon monoxide (CO), NH_3, and particles with an aerodynamic diameter less than or equal to a nominal 10 and 2.5 micrometers (i.e., primary PM_{10} and $PM_{2.5}$). The inventories included summer day, winter day, and average day emissions. However, not all agencies included daily emissions in their inventories, and, for the agencies that did, the temporal basis for the daily emissions varied between agencies. Consequently, the inventories did not contain a complete and consistent set of daily emissions for all source categories and pollutants. Therefore, daily emissions prepared by S/L/T agencies were maintained in the NIF files if they met quality assurance (QA) review requirements. However, CENRAP requested that the daily emissions not be included in the SMOKE input files. The temporal profiles prepared for this project will be used to calculate daily emissions. If needed, the daily emissions prepared by the agencies may be retrieved from the NIF database files.

The consolidated inventories were prepared using the inventories that S/L/T agencies submitted to the United States (U.S.) Environmental Protection Agency (EPA) from May through July of 2004 as a requirement of the Consolidated Emissions Reporting Rule (CERR). The EPA's format and content QA programs (and other QA checks not included in EPA's QA software) were run on each inventory to identify format and/or data content issues (EPA, 2004a).

E.H. Pechan & Associates, Inc. (Pechan) and the University of North Carolina, Chapel Hill – Carolina Environmental Program (UNC-CEP) worked with the CENRAP's Emission Inventory (EI) Workgroup and the S/L/T agencies to resolve QA issues and augment the inventories to fill data gaps in accordance with the Methods Plan and Quality Assurance Project Plan (QAPP) prepared for this project (CENRAP, 2004a; CENRAP, 2004b). The EI Workgroup and S/L/T agencies reviewed the draft inventory and ancillary files from December 2004 through February 2005. The inventories and SMOKE input files were revised to incorporate the review comments.

B. Summary of the 2002 Base Year Inventories

This section of the report provides a brief summary of the consolidated 2002 base year inventories for the CENRAP region. Table 1 shows total annual emissions for CAPs and NH_3 for point, area, nonroad, and onroad sources. The sector contributing the highest emissions varies by pollutant. Point sources account for the highest percentage of total NO_x (36%) and SO_2 (87%) emissions. Area sources account for the highest percentage of total VOC (50%), primary PM_{10} (PM10-PRI (93%)), primary $PM_{2.5}$ (PM25-PRI (81%)), and NH_3 (86%) emissions. Onroad sources account for the highest percentage of CO (53%) emissions. Onroad and nonroad sources each account for 18% of total VOC emissions. Onroad sources account for 29% and nonroad sources account for 19% of total NO_x emissions.

Table 2a shows total annual emissions by state/tribe and pollutant for all four sectors combined. Tables 2b through 2e show total annual emissions by state/tribe and pollutant for area, point, nonroad, and onroad sources, respectively. Tables A-1 through A-6 in Appendix A provide summaries of annual emissions by source category and sector for VOC, NO_x, CO, SO_2, PM10-PRI and PM25-PRI, and NH_3, respectively. The emissions in each table are sorted in descending order with the highest emitting categories listed at the top of the table. The tables also show annual emissions as a percentage of total emissions from all sectors, and the cumulative percentage contribution. Chapter III of this report identifies additional summaries of emissions, including county-level summaries that contain the data source codes that identify the origin and year of emissions data.

In addition to the CAPs and NH_3, emissions for carbon dioxide (CO_2), methane (CH_4), elemental carbon (EC), organic carbon (OC), total primary and filterable particulate matter (PM-PRI/-FIL), filterable PM-10 (PM10-FIL), and filterable $PM_{2.5}$ (PM25-FIL) were carried in the mass emissions inventory files. However, these pollutants are not included in the summaries since the emissions for these pollutants were not consistently reported by all S/L/T agencies for a given sector. In addition, AR included wind-blown fugitive dust emissions in its area source inventory, and some but not all S/L/T agencies included NH_3 emissions associated with natural sources (e.g., domestic and wild animals) in their area source inventories. These emissions were kept in the area miscellaneous sources inventory, and are included in the sector-level summaries (as geogenic and natural/biogenic sources) described in Chapter III of this report.

C. Organization of the Report

In Chapter II of this report, section A provides an introduction to the chapter and sections B through D present the data sources and methods applied to prepare the mass emissions inventory and SMOKE input files for point, area, and nonroad sources within the CENRAP region.

Section E explains the data sources and methods applied to prepare 2002 Continuous Emissions Monitoring (CEM) data for the entire CENRAP modeling domain in the SMOKE and the RPO data exchange protocol formats. Section F explains the data sources and methods for developing temporal, speciation, and spatial allocation profiles for the point, area, and nonroad source categories included in the CENRAP region inventories. Section G provides documentation of the SMOKE and RPO data exchange protocol files prepared under this project.

Chapter III and Appendix A provide summaries of the 2002 emissions inventories for point, area, nonroad, and onroad sources within the CENRAP region. Chapter IV identifies the inventory and supporting data files compiled for areas outside of the CENRAP region, and Chapter V provides the references for this report.

Table 1. Summary of Annual Emissions for the CENRAP Region by Sector and Pollutant

Sector	VOC Tons/Year	VOC Percent of Total	NO$_x$ Tons/Year	NO$_x$ Percent of Total	CO Tons/Year	CO Percent of Total	SO$_2$ Tons/Year	SO$_2$ Percent of Total	PM10-PRI Tons/Year	PM10-PRI Percent of Total	PM25-PRI Tons/Year	PM25-PRI Percent of Total	NH$_3$ Tons/Year	NH$_3$ Percent of Total
Point	618,130	14	1,835,970	36	1,891,315	8	2,198,712	87	396,154	5	248,416	13	197,771	12
Area	2,167,263	50	850,491	16	3,778,511	17	218,259	9	6,923,304	93	1,486,600	81	1,468,741	86
Nonroad	806,173	18	982,061	19	4,933,745	22	65,812	3	90,721	1	83,964	5	1,335	0
Onroad	792,310	18	1,483,668	29	11,834,984	53	44,678	2	33,066	0	23,529	1	47,869	3
Totals	4,383,876	100	5,152,190	100	22,438,555	100	2,527,461	100	7,443,244	100	1,842,509	100	1,715,717	100
Dominant Sector[1]	Area		Point		Onroad		Point		Area		Area		Area	

[1] Identifies the sector accounting for the majority of the emissions for each pollutant.

Table 2a. Summary of All Sector Source Emissions by State and Pollutant

State FIPS/ Tribal Code	State/Tribal Name	VOC Tons/Year	VOC Percent of Total	NO$_x$ Tons/Year	NO$_x$ Percent of Total	CO Tons/Year	CO Percent of Total	SO$_2$ Tons/Year	SO$_2$ Percent of Total	PM10-PRI Tons/Year	PM10-PRI Percent of Total	PM25-PRI Tons/Year	PM25-PRI Percent of Total	NH$_3$ Tons/Year	NH$_3$ Percent of Total
05	Arkansas	342,534	7.8	285,782	5.6	1,630,938	7.3	127,291	5.0	328,922	4.4	134,913	7.3	138,272	8.1
19	Iowa	283,064	6.5	325,187	6.3	1,579,578	7.0	166,914	6.6	517,816	7.0	122,174	6.6	253,441	14.8
20	Kansas	264,217	6.0	376,362	7.3	2,191,899	9.8	161,064	6.4	783,946	10.5	227,427	12.3	183,539	10.7
22	Louisiana	387,577	8.8	680,322	13.2	2,263,916	10.1	388,280	15.4	332,720	4.5	157,447	8.6	88,930	5.2
27	Minnesota	540,978	12.3	463,302	9.0	2,800,101	12.5	153,978	6.1	833,308	11.2	202,666	11.0	183,354	10.7
29	Missouri	381,944	8.7	476,260	9.2	2,614,860	11.7	419,985	16.6	1,000,506	13.4	207,942	11.3	157,100	9.2
31	Nebraska	145,701	3.3	250,823	4.9	905,317	4.0	90,954	3.6	469,741	6.3	96,356	5.2	169,847	9.9
40	Oklahoma	386,157	8.8	445,487	8.7	2,118,993	9.4	167,292	6.6	740,852	10.0	174,007	9.4	133,245	7.8
48	Texas	1,651,699	37.7	1,848,165	35.9	6,332,252	28.2	851,703	33.7	2,423,179	32.6	517,686	28.1	407,989	23.8
405	Fond du Lac Tribe	3	0.0	501	0.0	700	0.0	0	0.0	12,254	0.2	1,892	0.1	0	0.0
	Totals	4,383,876	100	5,152,190	100	22,438,555	100	2,527,461	100	7,443,244	100	1,842,509	100	1,715,717	100

Table 2b. Summary of Area Source Emissions by State and Pollutant

State FIPS/ Tribal Code	State/Tribal Name	VOC		NO$_x$		CO		SO$_2$		PM10-PRI		PM25-PRI		NH$_3$	
		Tons/ Year	Percent of Total	Tons/ Year	Percent of Total	Tons/ Year	Percent of Total	Tons/ Year	Percent of Total	Tons/ Year	Percent of Total	Tons/ Year	Percent of Total	Tons/ Year	Percent of Total
05	Arkansas	92,676	4.3	27,552	3.2	379,881	10.1	27,236	12.5	273,217	4.0	91,735	6.2	130,773	8.9
19	Iowa	111,851	5.2	6,920	0.8	102,183	2.7	3,290	1.5	477,093	6.9	97,987	6.6	247,156	16.8
20	Kansas	143,905	6.6	43,114	5.1	875,433	23.2	14,084	6.5	728,377	10.5	194,959	13.1	116,884	8.0
22	Louisiana	124,311	5.7	99,060	11.7	530,135	14.0	83,253	38.1	245,162	3.5	84,068	5.7	75,382	5.1
27	Minnesota	176,118	8.1	56,740	6.7	146,623	3.9	14,783	6.8	749,605	10.8	146,883	9.9	148,588	10.1
29	Missouri	133,818	6.2	34,749	4.1	269,007	7.1	48,317	22.1	962,807	13.9	182,266	12.3	120,341	8.2
31	Nebraska	69,986	3.2	15,023	1.8	81,169	2.2	7,748	3.6	447,703	6.5	83,852	5.6	137,406	9.4
40	Oklahoma	212,669	9.8	115,788	13.6	465,631	12.3	11,779	5.4	714,805	10.3	157,444	10.6	104,587	7.1
48	Texas	1,101,929	50.8	451,545	53.1	927,878	24.6	7,769	3.6	2,312,288	33.4	445,522	30.0	387,626	26.4
405	Fond du Lac Tribe	0	0.0	0	0.0	571	0.02	0	0.0	12,246	0.18	1,883	0.13	0	0.0
	Totals	2,167,263	100	850,491	100	3,778,511	100	218,259	100	6,923,304	100	1,486,600	100	1,468,741	100

Table 2c. Summary of Point Source Emissions by State and Pollutant

State FIPS/ Tribal Code	State/Tribal Name	VOC		NO$_x$		CO		SO$_2$		PM10-PRI		PM25-PRI		NH$_3$	
		Tons/ Year	Percent of Total	Tons/ Year	Percent of Total	Tons/ Year	Percent of Total	Tons/ Year	Percent of Total	Tons/ Year	Percent of Total	Tons/ Year	Percent of Total	Tons/ Year	Percent of Total
05	Arkansas	158,982	25.7	75,925	4.1	360,537	19.1	93,210	4.2	46,882	11.8	35,484	14.3	5,166	2.6
19	Iowa	39,156	6.3	122,124	6.7	51,236	2.7	156,706	7.1	28,788	7.3	13,650	5.5	3,366	1.7
20	Kansas	27,458	4.4	165,284	9.0	83,307	4.4	140,371	6.4	47,081	11.9	25,073	10.1	63,914	32.3
22	Louisiana	89,025	14.4	312,634	17.0	285,395	15.1	286,050	13.0	73,333	18.5	60,899	24.5	9,237	4.7
27	Minnesota	70,415	11.4	159,324	8.7	361,952	19.1	132,773	6.0	64,645	16.3	38,954	15.7	29,726	15.0
29	Missouri	36,109	5.8	181,675	9.9	136,914	7.2	361,548	16.4	20,949	5.3	11,079	4.5	31,120	15.7
31	Nebraska	7,274	1.2	58,619	3.2	11,008	0.6	73,487	3.3	13,105	3.3	4,638	1.9	30,731	15.5
40	Oklahoma	36,987	6.0	158,972	8.7	78,430	4.2	148,852	6.8	18,009	4.6	9,776	3.9	24,256	12.3
48	Texas	152,720	24.7	600,912	32.7	522,407	27.6	805,714	36.6	83,354	21.0	48,855	19.7	255	0.1
405	Fond du Lac Tribe	3	0.00	501	0.03	129	0.01	0	0.00	8	0.00	8	0.00	0	0
	Totals	618,130	100	1,835,970	100	1,891,315	100	2,198,712	100	396,154	100	248,416	100	197,771	100

Table 2d. Summary of Nonroad Source Emissions by State and Pollutant

State FIPS/ Tribal Code	State/Tribal Name	VOC		NOx		CO		SO2		PM10-PRI		PM25-PRI		NH3	
		Tons/ Year	Percent of Total	Tons/ Year	Percent of Total	Tons/ Year	Percent of Total	Tons/ Year	Percent of Total	Tons/ Year	Percent of Total	Tons/ Year	Percent of Total	Tons/ Year	Percent of Total
05	Arkansas	51,339	6.4	64,336	6.6	285,282	5.8	3,299	5.0	5,850	6.5	5,382	6.4	49	3.7
19	Iowa	61,562	7.6	97,835	10.0	421,453	8.5	3,921	6.0	10,056	11.1	9,225	11.0	57	4.3
20	Kansas	28,009	3.5	85,234	8.7	273,433	5.5	3,913	6.0	6,770	7.5	6,196	7.4	115	8.6
22	Louisiana	109,598	13.6	117,250	11.9	549,031	11.1	14,324	21.8	10,663	11.8	9,791	11.7	563	42.2
27	Minnesota	213,527	26.5	108,293	11.0	963,290	19.5	3,834	5.8	15,946	17.6	14,657	17.5	87	6.5
29	Missouri	130,522	16.2	102,312	10.4	781,749	15.8	5,214	7.9	13,162	14.5	12,076	14.4	74	5.5
31	Nebraska	27,540	3.4	121,496	12.4	213,112	4.3	7,900	12.0	7,721	8.5	6,997	8.3	59	4.4
40	Oklahoma	49,763	6.2	51,410	5.2	331,901	6.7	2,407	3.7	5,405	6.0	4,946	5.9	280	21.0
48	Texas	134,314	16.7	233,896	23.8	1,114,495	22.6	20,999	31.9	15,149	16.7	14,695	17.5	52	3.9
405	Fond du Lac Tribe	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0
	Totals	806,173	100	982,061	100	4,933,745	100	65,812	100	90,721	100	83,964	100	1,335	100

Table 2e. Summary of Onroad Source Emissions by State and Pollutant

State FIPS/ Tribal Code	State/Tribal Name	VOC		NOx		CO		SO2		PM10-PRI		PM25-PRI		NH3	
		Tons/ Year	Percent of Total	Tons/ Year	Percent of Total	Tons/ Year	Percent of Total	Tons/ Year	Percent of Total	Tons/ Year	Percent of Total	Tons/ Year	Percent of Total	Tons/ Year	Percent of Total
05	Arkansas	39,537	5.0	117,969	8.0	605,238	5.1	3,545	7.9	2,973	9.0	2,311	9.8	2,284	4.8
19	Iowa	70,494	8.9	98,308	6.6	1,004,707	8.5	2,997	6.7	1,879	5.7	1,312	5.6	2,863	6.0
20	Kansas	64,846	8.2	82,730	5.6	959,725	8.1	2,695	6.0	1,718	5.2	1,200	5.1	2,626	5.5
22	Louisiana	64,643	8.2	151,378	10.2	899,355	7.6	4,653	10.4	3,563	10.8	2,689	11.4	3,748	7.8
27	Minnesota	80,918	10.2	138,946	9.4	1,328,236	11.2	2,588	5.8	3,111	9.4	2,172	9.2	4,953	10.4
29	Missouri	81,495	10.3	157,523	10.6	1,427,190	12.1	4,907	11.0	3,589	10.9	2,521	10.7	5,565	11.6
31	Nebraska	40,902	5.2	55,685	3.8	600,028	5.1	1,818	4.1	1,212	3.7	869	3.7	1,651	3.5
40	Oklahoma	86,738	11.0	119,317	8.0	1,243,031	10.5	4,253	9.5	2,633	8.0	1,840	7.8	4,122	8.6
48	Texas	262,737	33.2	561,811	37.9	3,767,472	31.8	17,222	38.6	12,388	37.5	8,615	36.6	20,057	41.9
405	Fond du Lac Tribe	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0
	Totals	792,310	100	1,483,668	100	11,834,984	100	44,678	100	33,066	100	23,529	100	47,869	100

II. CRITERIA AIR POLLUTANT AND NH$_3$ INVENTORIES FOR THE CENRAP REGION

A. Introduction

The inventory data were taken from the following sources in priority order:

a. The inventories that S/L/T agencies submitted to EPA from May through July 2004;
b. Supplemental data supplied by the S/L/T agencies (e.g., data that have been finalized or revised after an agency submitted its inventory to EPA);
c. Inventories developed by CENRAP; and
d. The 2002 preliminary NEI.

Table 3 provides a summary of the S/L/T point, area, and nonroad source inventories that the S/L/T agencies submitted to EPA. The EPA performed some limited QA review of the S/L/T inventories to identify format, referential integrity, and duplicate record issues. The EPA revised the inventories to address these issues and made the files available to the S/L/T agencies on August 6, 2004. These inventory files were used as the starting point for the CENRAP inventory. Pechan then performed QA review of the inventories to identify (1) remaining QA issues that needed to be resolved through consultation with the EI Workgroup, and (2) missing data that needed to be added to the inventories to support air quality modeling studies.

Table 3. Summary of 2002 Inventories that S/L/T Agencies Submitted to EPA [1]

State/Local/Tribal Agency	Point	Area	Commercial Marine Vessels	Railroad Locomotives	Aircraft
AR	x	x	x	x	x
IA	x	x[3]			
KS	x[2]	x[3]		x[3]	
LA	x	x[3]		x[3]	
MN	x[2]	x		x	x[4]
Fond du Lac Band of the Minnesota Chippewa Tribe	x	x			
MO	x[2]	x[3]		x[3]	
NE-State	x	x			
NE-Lincoln (Lancaster County)	x	x			
NE-Omaha (Douglas County)	x				
OK	x	x			
TX	x	x	x	x	x

[1] An "x" identifies the sector for which a S/L/T agency submitted a CAP inventory to EPA.
[2] State submitted separate inventories for the criteria air pollutants and NH$_3$.
[3] State submitted only an NH$_3$ inventory.
[4] State included its inventory for commercial and military aircraft and auxiliary power units in its point source inventory.

After resolving the QA issues, the files were updated to revise or add data provided by the S/L/T agencies. Inventories developed by CENRAP were added to the inventories as directed by the S/L/T agencies. Then, the inventories were compared to the 2002 preliminary NEI to identify

categories that existed in the NEI but not the S/L/T inventories. The NEI data were added to the S/L/T inventories as directed by the EI Workgroup.

The following sections B, C, and D provide the methods for preparing the consolidated emissions inventories for point, area, and nonroad sources, respectively. Each section discusses the QA review that was conducted on the S/L/T inventories to identify QA issues that were corrected to support air quality modeling. Then, each section discusses the augmentation procedures that were applied to fill in missing data. These procedures identify supplemental data that S/L/T agencies provided to add to or replace data in their inventories, the CENRAP-sponsored inventories that were added to the inventories as approved by the S/L/T agencies, and the 2002 NEI categories that S/L/T agencies requested to be added to their inventories. The augmentation procedures also explain how missing PM emissions were estimated and added to the inventories after incorporating inventory data supplied by S/L/T agencies, the CENRAP-sponsored inventory data, and data from the 2002 NEI.

For point sources that are subject to CEM requirements, section E discusses the data sources and procedures for preparing the 2002 CEM data and temporal profiles to support air quality modeling. For point, area, and the non-NONROAD model source categories, Section F discusses the data sources and procedures for preparing temporal, speciation, and spatial allocation profiles needed to support air quality modeling. Section G discusses the formats in which the final emissions, temporal, speciation, and allocation data were prepared.

B.   Point Source Inventory Methods

1.   Data Sources

For each S/L/T inventory submitted to EPA, Table 4 provides a summary of the pollutants included in each inventory, and compares the number of counties in the inventory to the number of counties in the 2002 preliminary NEI and in each S/L/T agency. The table also compares the number of facilities in the S/L/T inventory to the number of facilities in the 2002 preliminary NEI.

The inventories obtained from EPA are in Access 2000 databases in NIF 3.0. Each inventory was loaded into an Oracle database in NIF 3.0 to combine the inventories into a single data set. Then, after loading the inventories into Oracle in NIF 3.0, the following updates were performed on the consolidated data set, if necessary:

Table 4. Summary of Pollutants, Number of Counties, and Number of Facilities in Point Source Inventories

State/Local/ Tribal Agency	CO	NH3	NOx	PM-PRI	PM10-PRI	PM25-PRI	PM10-FIL	PM25-FIL	PM-CON	SO2	VOC	Number of Counties in 2002 S/L/T Inventory	Number of Counties in 2002 Preliminary NEI	Number of Counties in State	Number of Facilities in 2002 S/L/T Inventory	Number of Facilities in 2002 Preliminary NEI
AR	x	x	x							x	x	57	60	75	227	324
IA	x	x	x	x	x	x				x	x	74	26	99	270	67
KS[1]	x	x	x		x	x	x	x		x	x	97	96	105	708	705
		x										104	16	105	3,319	20
LA	x	x	x				x	x		x	x	59	60	64	906	1,033
MN[1]	x	x	x		x	x		x		x	x	87	82	87	2,628	836
		x										77	13	87	542	14
Fond du Lac Band of the Minnesota Chippewa Tribe	x		x	x	x					x	x	NA[2]	NA	NA	5	NA
MO[1,3]	x	x	x		x					x	x	109	103	115	1,646	720
		x										105	16	115	1,181	20
NE-State	x		x			x				x	x	27	72	93	36	634
NE-Lincoln (Lancaster County)	x		x		x					x	x	1	1	93	17	100
NE-Omaha (Douglas County)	x	x	x	x	x	x				x	x	1	1	93	68	87
OK	x	x	x	x	x	x				x	x	66	69	77	397	1,046
TX	x		x		x	x				x	x	201	203	254	1,914	3,268

[1]State submitted separate inventories for the criteria pollutants and NH3. The NH3 inventory was prepared under a CENRAP-sponsored project. The number of counties and facilities in the 2002 preliminary NEI are for facilities with annual NH3 emissions. Note that the number of counties and facilities with annual NH3 emissions in KS and MO in the 2002 preliminary NEI are the same.

[2] NA = Not Applicable.

[3] The data for MO are from its original inventory submittal to EPA.

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- Hazardous air pollutant (HAP) records were removed since the inventory will support regional haze, fine PM, and ozone modeling.

- Pollutant codes were corrected to make them NIF 3.0 compliant (e.g., update PMPRI pollutant code to PM-PRI). Additionally, other codes were identified for remediation on a case-by-case basis.

- Records with a submittal flag indicating deletions (submittal_flag = 'D' or 'RD') were removed from the inventory.

- Null values in the tribal code field were updated to '000' since this field is a part of the data key that defines records as unique in all eight NIF tables.

- The following NIF plus fields were added to the Transmittal (TR), Site (SI), Emission Unit (EU), Emission Release Point (ER), Emission Process (EP), Emission Period (PE), Emission (EM), and Control Equipment (CE) tables:

  - Data Source Codes:

Code	Description
S	State agency-supplied data.
L	Local agency-supplied data.
R	Tribal agency-supplied data.
P	Regional Planning Organization.
SC	S/L/T agency Corrected.
AUG-A	PM Augmentation: ad-hoc change.
AUG-C	PM Augmentation: standard augmentation method.
AUG-O	PM Augmentation: set PMxx-FIL = PMxx-PRI where for SCCs starting with 10 (external fuel combustion) and 20 (internal fuel combustion). Note: emission factors and particle-size data for estimating condensible emissions for fuel combustion SCCs starting with 30 were not available; therefore, condensible emissions were not estimated for these processes if an agency provided filterable and not primary emissions for these processes.
AUG-Z	PM Augmentation: automated fill-in of zero values where all PM for a particular process is zero.
GENPARENT	Data source where a parent record was system generated.

  - Revision Date: This field indicates the month and year during which the last revision was made to a record.

  - State Federal Information Processing Standard (FIPS): This field indicates the state FIPS code of the submittal.

  - County FIPS: This field indicates the county FIPS code of the submittal.

- The following NIF plus fields were added to the EM table:

  - Emission Ton Value: This field indicates the values of the emissions in tons. This field was used to prepare summaries of emissions on a consistent emission unit basis.

  - Emission Type Period: This field indicates the period of the Emission Type – either ANNUAL or NONANNUAL. This field was used to prepare summaries of annual emissions.

  - CAP_HAP: This field identifies records for CAP versus records for HAPs. For the CENRAP inventory, the flag is CAP for all records.

  - Year: This field indicates the year of the data; for this inventory, it is 2002.

2.   QA Review

QA review on the inventories was conducted in accordance with the QA procedures specified in the QAPP for this project (CENRAP, 2004b). The following discusses the QA diagnoses that were run on the consolidated point source inventory data set. The QA issues identified were communicated to the S/L/T agencies through a set of QA Summary Reports in Excel Workbook files. The agencies provided corrections to the data in the Excel files and the inventory was updated with the corrections.

a.   County and Facility Coverage

S/L/T agencies for which the number of counties in their point source inventory submittal to EPA declined relative to the number of counties in the NEI include AR (-3 counties), LA (-1 parish), OK (-3 counties), TX (-2 counties), and NE (-45 counties) (see Table 2). NE moved its small point sources from its area source inventory to its point source inventory; therefore, this increased the county coverage in its point source inventory. States for which the number of counties in their point source inventory submittal to EPA increased relative to the number of counties in the NEI included IA (+48 counties), MO (+6 counties), MN (+5 counties), and KS (+1 county). The NEI did not contain any tribal data for the CENRAP region.

As shown in Table 4, the number of facilities included in the inventories for AR, LA, NE, NE – Omaha, NE – Lincoln, OK, and TX is lower than the number of facilities included in the 2002 preliminary NEI. An electronic match was conducted on the state and county FIPS and facility identification (ID) code between the two inventories to identify facilities and their emissions in the 2002 preliminary NEI but not in the S/L/T agency inventories. However, due to changes that S/L/T agencies made to facility ID codes in their inventories, the electronic matching did not work well as this procedure identified facilities that are in both inventories but with different facility ID codes. The results of this comparison were provided to the agencies for review and all of the agencies confirmed that there were no missing facilities in the point source inventories they submitted to EPA.

b. *Pollutant Coverage*

As shown in Table 4, all of the S/L/T inventories contain emissions for CO, NO_x, SO_2, and VOC. The inventories for TX; NE state; Lancaster County, NE; and the Fond du Lac Band of the Minnesota Chippewa Tribe did not include NH_3 emissions. KS, MN, and MO submitted NH_3 inventories prepared under a CENRAP-sponsored project. These NH_3 inventories were merged with the CAP inventories for these three states. Pechan worked with these three agencies to resolve facility matching and duplicate records that occurred in the Transmittal (TR), Site (SI), Emission Release Point (ER), Emission Unit (EU), and EP tables.

Except for AR, all S/L/T agencies included one or more forms of PM, PM_{10}, and/or $PM_{2.5}$ in their inventories. AR subsequently provided a new inventory that included PM_{10} and $PM_{2.5}$ emissions data. The modeling inventory needs to include a complete set of PM10-PRI and PM25-PRI pollutants for all sources of PM_{10} and $PM_{2.5}$. Therefore, based on the data the S/L/T agencies included in their inventories, procedures were developed and applied to fill in missing pollutant data needed to prepare a complete PM10-PRI and PM25-PRI inventory. The QA review of the PM data is discussed further in the following section, and the augmentation procedure is discussed in section II.B.4.

c. *Particulate Matter (PM) Emissions Consistency and Completeness Review*

The following consistency checks were performed at the EM table data key level (for annual emissions) to compare PM emissions:

- If a process was associated with a PM emission record, but was missing one or more of the following (as appropriate for the Source Classification Code [SCC] [i.e., condensible PM (PM-CON) is associated with fuel combustion only]): PM10-FIL, PM10-PRI, PM25-FIL, PM25-PRI, or PM-CON, the record was flagged for review.

- The following equations were used to determine consistency:

    PM10-FIL + PM-CON = PM10-PRI
    PM25-FIL + PM-CON = PM25-PRI
    PM-FIL   + PM-CON = PM-PRI (as appropriate)

- The following comparisons were applied to determine consistency:

    PM10-PRI >= PM10-FIL
    PM25-PRI >= PM25-FIL
    PM10-PRI >= PM-CON
    PM25-PRI >= PM-CON
    PM10-FIL >= PM25-FIL
    PM10-PRI >= PM25-PRI
    PM-PRI   >= PM10-PRI (as appropriate)
    PM-PRI   >= PM25-PRI (as appropriate)

PM-FIL   >= PM10-FIL (as appropriate)
PM-FIL   >= PM25-FIL (as appropriate)

If the data failed one of these checks it was diagnosed as an error. If a S/L/T agency did not provide corrections to these errors, the errors were corrected/filled in according to the augmentation procedure discussed in section II.B.4.

d.   *Emission Release Point (ERP) Coordinate Review*

Location coordinates for point sources were evaluated using geographic information system (GIS) mapping to determine if the coordinates were within 0.5-kilometers of the boundary of the county in which the source was located. If not, the S/L/T agency was asked to review the coordinates and provide corrections to either the coordinates or the state and county FIPS codes. The 0.5-kilometer test resulted in a large number of ERPs for review by the agencies. Therefore, to assist S/L/T agencies in prioritizing their review of coordinates, ERP records with coordinates located more than 0.5, 1, 2, 3, 5, 7, and 10 or more kilometers from their county boundary, and coordinates that mapped outside of their state boundary were identified. Annual emissions summed to the ERP level were included in the QA Summary Report to identify records with zero emissions for all pollutants and to identify the highest emitting stacks.

e.   *ERP Parameter Review*

The EPA's QA guidance for diagnosing ERP issues for the point source NEI (EPA, 2004b) was applied to identify QA issues in the S/L/T point source inventories. The QA guidance involved diagnosing the correct assignment of the ERP type (i.e., stack or fugitive), parameters with zero values, parameters not within the range of values specified in the EPA's QA procedures, and consistency checks (i.e., comparing calculated values against expected values). In many cases errors were due to defaulted zeros, and submitting agencies were requested to provide the value. In other cases, out-of-range errors were caused by unit conversion issues (e.g., stack parameters were in ft, ft/sec, cu ft/sec or degrees Fahrenheit). The agencies were asked to provide corrections or additions to ERP parameters, or note in the QA Summary Report that records flagged with potential QA issues were corrected. If an agency did not provide corrections for out-of-range or missing values, the data were corrected or filled in according to the ERP augmentation procedure discussed in section II.B.4.

f.   *Control Device Type and Control Efficiency Data Review*

The CE codes in the "Primary Device Type Code" and "Secondary Device Type Code" fields were reviewed to identify invalid codes (i.e., codes that did not exist in the NIF 3.0 reference table) and missing codes (e.g., records with a null or uncontrolled code of 000 but with control efficiency data).

QA review of control efficiency data involved diagnosis of two types of errors. First, records were reviewed to identify control efficiency values that were reported as a decimal rather than as a percent value. Records with control efficiencies with decimal values were flagged as a

potential error (although not necessarily an error, since the real control efficiency may be less than 1 percent).

The second check identified records where 100% control was reported in the CE table, but the emissions in the EM table were greater than zero and the rule effectiveness value in the EM table was null, zero, or 100% (implying 100 percent control of emissions). Because many agencies did not populate the rule effectiveness field or a default value of zero was assigned, records with null or zero rule effectiveness values were included where the CE was 100% and emissions were greater than zero. For records that met these criteria, the records were reviewed by the S/L/T agency to provide corrections, if necessary.

> ### g.   *Start and End Date Checks*

QA review was conducted to identify start date and end date values in the PE and EM tables to confirm consistency with the inventory year in the transmittal table, and to confirm that the end date reported is greater than the start date reported.

> ### h.   *Annual and Daily Emissions Comparison*

The following QA checks were conducted to identify potential errors associated with the incorrect reporting of daily and/or annual emissions:

- Any "DAILY" type record that is greater than its associated "ANNUAL". Only TX and MO sent DAILY records. While TX did have DAILY records greater than annual (due to the TX original database rounding of TON vs. LB records). For the CENRAP point source inventory it was determined that the most efficient approach was to use only the ANNUAL records.

> ### 3.   Responses from S/L/T Agencies

The point source inventories were revised to incorporate the corrections that the S/L/T agencies provided in response to the QA issues identified in their inventories. Where responses from the S/L/T agencies were not provided, standard procedures were used to default or augment the data. Section II.4 describes in more detail the gap filling and augmentation procedures. Additionally, included with this report is a set of S/L/T-specific files indicating responses to specific QA issues and defaults that were implemented with remaining QA issues. An example of a default implemented would be the correction of TONS to TON in a unit field. Each S/L/T set of files is accompanied by a Read_me.txt file that describes the files in further detail. The files included with each S/L/T documentation set (if the QA issue existed) are the following (based on the QA Issues discussed above):

- PM Augmentation QA Summary
- PM Augmentation Preliminary Review
- Stack Parameter QA Summary
- Stack Coordinates QA Summary
- Stack Parameter and Coordinate Augmentation

- SCC QA Summary
- Control Device/Efficiency Summary

In addition, the listing of state QA files also includes the output of the EPA QA checker as run on the final CENRAP inventory, and the PM ratio factor table (as described in section II.B.4.b) as developed for the CENRAP SCC and control devices.

4. Gap Filling and Augmentation

The following discusses the augmentation procedures that were used to fill in missing data that were not supplied by the S/L/T agencies.

a. CENRAP Sponsored Inventories

The CENRAP inventory includes data generated from CENRAP sponsored source type oriented inventories. The following inventories (and the relevant S/L/T agencies) were included with the CENRAP inventory:

- CENRAP NH_3 Inventory (IA, KS, MO, MN, NE, OK)
- MN Fires Inventory (MN)
- CENRAP Prescribed Burning Inventory (all states)
- CENRAP Concentrated Animal Feeding Operations (CAFO) Dust Inventory (all states)

b. PM Augmentation

The PM augmentations process gap-fills missing PM pollutant complements. For example, if a S/L/T agency provided only PM10-PRI pollutants the PM augmentation process filled in the PM25-PRI pollutants. The steps in the PM augmentation process were as follows:

- Initial QA and remediation of S/L/T provided PM pollutants;
- Development of PM factor ratios based on factors from FIRE (Factor Information REtrieval) version 6.2 and the PM Calculator (EPA, 2003; EPA, 2004c);
- Implementation of the ratios developed in step 2.; and
- Presentation of PM augmentation results to S/L/T agencies for review and comment

Note: There are two Access databases that accompany this documentation. The first database is the *Reference Tables for PM Augmentation*. This database contains the SCC Control Device Ratio table, the Emission Factors table and Emission Factors Crosstab table discussed in Step 2. The PM Calculator ratio table can be provided upon request – it contains all possible combinations for SCC and Control Device types that are available in the PM Calculator.

An additional database (*PM Augmentation Draft*) that contains the PM crosstab table with the preliminary PM Augmentation results and a QA table (which may be empty) was provided. This database will be discussed in Step 3 and Step 4.

These steps are further detailed below.

1.   *Initial QA and Remediation of PM Pollutants*

S/L/T agencies were initially presented with files that detailed potential inconsistencies and missing information in their PM pollutant inventory. Inconsistencies in PM pollutants include the following:

- PM-PRI less than PM10-PRI, PM25-PRI, PM10-FIL, PM25-FIL, or PM-CON
- PM-FIL less than PM10-FIL, PM25-FIL
- PM10-PRI less than PM25-PRI, PM10-FIL, PM25-FIL or PM-CON
- PM10-FIL less than PM25-FIL
- PM25-PRI less than PM25-FIL or PM-CON
- The sum of PM10-FIL and PM-CON not equal to PM10-PRI
- The sum of PM25-FIL and PM-CON not equal to PM25-PRI

Potential missing information was summarized in a table which detailed the variety of cases provided by the S/L/T agency. For example, a S/L/T agency might have provided PM10-FIL and PM25-FIL for some processes, but for other processes only PM10-FIL was provided.

S/L/T agencies were asked to review this information and provide corrections where possible. In general, corrections (or general directions) were provided in the case of the potential inconsistency issues. An example of a general direction provided by a S/L/T agency was to remove PM25-FIL where greater than PM10-FIL because the PM10-FIL was (in their particular case) known to be more reliable. In other cases, the agency-provided specific process level pollutant corrections. In general, if specific direction was not provided by the agency, priority was given to the PM_{10} number.

2.   *Development of PM Factor Ratio*

The primary deliverable of this step of the process was the development of a table keyed by SCC, primary control device, and secondary control device. This table is called the SCC Control Device Ratios table. The table structure follows the discussion below.

This table was filled according to the following steps:

- Ratios (both condensible and noncondensible) were added from FIRE for SCCs starting with 10* (external fuel combustion) and 20* (internal fuel combustion) where there was a direct match between the provided SCC, and primary and secondary control devices.
- Ratios (non-condensable) were added from the PM Calculator for SCCs starting with 10* and 20* where there was not a direct match between the provided SCC, and primary and secondary control devices. Condensible ratios were added from the PM Calculator based on the uncontrolled SCC for these SCCs. In some cases, it was necessary to map the SCC and control devices to the PM calculator to find a match

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for the noncondensible ratios. In some cases, it was necessary to map the SCC to FIRE to find a match for condensible ratios.

Table 5. Description of the Field Names and Descriptions for the SCC Ratio Table

Field Name	Field Description
PM Calculator	A "Yes" in this field indicates that at least some of the information was retrieved from the PM Calculator
FIRE	A "Yes" in this field indicates that at least some of the information was retrieved from the Emission Factors table. A "Condensible Ratios" in this field indicates that the condensible ratios factors were retrieved from this table.
Other	A field to indicate other sources as necessary.
SCC	Source category code from the S/L/T agency-provided data.
SCC_DESC	Description of source category code from the S/L/T agency-provided data.
maptoSCC	This field equals SCC unless the SCC provided was not found in the appropriate source table. In that case, the SCC was mapped using the closest available appropriate mapping choice.
maptoSCC_DESC	Description of the maptoSCC.
mapSCCNote	Any notes related to the mapping of the SCC. A "Yes" in this field indicates that the SCC was mapped.
PD	Primary device type from the S/L/T agency provided data.
PD_DESC	Description of the primary device (PD).
maptoPD	This field equals PD unless the PD provided was not found in the appropriate source table. In that case, the PD was mapped using the closest available appropriate mapping choice.
maptoPD_DESC	Description of the maptoPD.
mapPDNote	Any notes related to the mapping of the PD. A "Yes" in this field indicates that the PD was mapped.
SD	Secondary device type from the S/L/T agency provided data.
SD_DESC	Description of the secondary device (SD).
maptoSD	This field equals SD unless the SD provided was not found in the appropriate source table. In that case, the SD was mapped using the closest available appropriate mapping choice.
maptoSD_DESC	Description of the maptoSD.
mapSDNote	Any notes related to the mapping of the SD. A "Yes" in this field indicates that the SD was mapped.
PM-FIL/PM10-FIL	This field and the following are ratios calculated from emission factors found either in FIRE or the PM calculator.
PM-FIL/PM25-FIL	This field and the following are ratios calculated from emission factors found either in FIRE or the PM calculator.
PM-FIL/PM-PRI	This field and the following are ratios calculated from emission factors found either in FIRE or the PM calculator.
PM-PRI/PM10-PRI	This field and the following are ratios calculated from emission factors found either in FIRE or the PM calculator.
PM-PRI/PM25-PRI	This field and the following are ratios calculated from emission factors found either in FIRE or the PM calculator.
PM10-FIL/PM25-FIL	This field and the following are ratios calculated from emission factors found either in FIRE or the PM calculator.
PM10-PRI/PM25-PRI	This field and the following are ratios calculated from emission factors found either in FIRE or the PM calculator.
PM-CON/PM10-FIL	Condensible ratios were calculate from FIRE if available for 10* and 20* SCCs. If condensible ratios were not found in FIRE for 10* and 20* these ratios were set to zero.
PM-CON/PM10-PRI	Condensible ratios were calculate from FIRE if available for 10* and 20* SCCs. If condensible ratios were not found in FIRE for 10* and 20* these ratios were set to zero.
PM-CON/PM25-FIL	Condensible ratios were calculate from FIRE if available for 10* and 20* SCCs. If condensible ratios were not found in FIRE for 10* and 20* these ratios were set to zero.
PM-CON/PM25-PRI	Condensible ratios were calculate from FIRE if available for 10* and 20* SCCs. If condensible ratios were not found in FIRE for 10* and 20* these ratios were set to zero.
PM-CON/PM-FIL	Condensible ratios were calculate from FIRE if available for 10* and 20* SCCs. If condensible ratios were not found in FIRE for 10* and 20* these ratios were set to zero.
PM-CON/PM-PRI	Condensible ratios were calculate from FIRE if available for 10* and 20* SCCs. If condensible ratios were not found in FIRE for 10* and 20* these ratios were set to zero.
RPO Specific Note	Indicates SCC and control device combinations are in the RPO inventory.
Additional Notes	Any notes regarding assumptions about ratios.

- For natural gas, process gas and liquefied petroleum gas SCCs starting with 10* and 20*, it was assumed (based on FIRE emission factors trend) that the PM-PRI/PM10-PRI/PM25-PRI ratio was equal to 1. It was also assumed that the PM-FIL/PM10-FIL /PM25- FIL was equal to 1. Condensible ratios were calculated from uncontrolled FIRE emission factors based for these SCCs. In some cases it was necessary to map the SCC to FIRE to find a match for condensible ratios.
- Ratios for SCCs not like 10* and 20* were obtained from the PM Calculator. It was assumed that the condensible component was zero.

Accompanying this document is a database containing the SCC Control Device Ratios table. Additionally, the Emission Factors and Emission Factors Crosstab table (which are derived from FIRE) are provided. The Emission Factors Crosstab table contains the ratios developed from the Emission Factors table. The Emission Factors table contains detailed information on the emission factors used to develop the ratios.

Note: Ratios from the PM calculator were developed using a standard input of 100 TONS of uncontrolled PM-FIL emissions.

3.   Implementation of the QA Ratios

In order to calculate the additional PM pollutants based on the SCC Control Device ratio table developed in the above step, a crosstab table was created from the EM table based on the following fields:

- State FIPS
- County FIPS
- Tribal Code
- Emission Unit ID
- Process ID
- Start Date
- End Date
- Emission Type
- SCC
- Primary Device Type
- Secondary Device Type

The primary and secondary device type fields were added based on information from the CE table. If control equipment information was not available these fields were defaulted to 000 ("UNCONTROLLED"). In the few cases where there was a conflict between the control devices reported for the same process for PM pollutants (for example, a PM10-PRI is listed as controlled, but PM-PRI did not have control information), the control device type was selected based on the controlled pollutant.

In addition to the fields listed above, the crosstab included the PM emission amounts for the particular process and a field that indicated whether those emissions existed in the inventory. These fields are as follows:

- PM_PRI
- PM_FIL
- PM10_PRI
- PM10_FIL
- PM25_PRI
- PM25_FIL
- PM_CON
- PM_PRI_EXISTS
- PM_FIL_EXISTS
- PM10_PRI_EXISTS
- PM10_FIL_EXISTS
- PM25_PRI_EXISTS
- PM25_FIL_EXISTS
- PM_CON_EXISTS

The emission values are in the PM_PRI, PM_FIL, PM10_PRI, PM10_FIL, PM25_PRI, PM25_FIL, PM_CON fields. The _EXISTS field indicates whether the pollutant was provided by the S/L/T agency. A zero indicates that the pollutant was not provided; a number greater than zero (usually one) indicates that it was provided by the S/L/T agency.

Prior to the development of this crosstab, the EM table was filled in as much as possible using basic assumptions. For example, if the S/L/T agency provided emissions that were equal to zero for PMs for a particular process, it was assumed that all PMs for that process were zero and they were filled in accordingly. Since that assumption was that for non 10* and 20* SCCs, the condensible value was zero – that would lead to PM10-FIL = PM10-PRI and PM25-FIL = PM25-PRI and PM-FIL = PM-PRI. Given that assumption, values for these pollutants were also filled in. After this data insertion, a subset of the crosstab was created. This subset only contained processes that required additional augmentation. The SCC control device type ratio table described in step 2 was based on only those SCC and control device types that required augmentation.

The next step was to fill in the missing information in this crosstab using the information found in the SCC Control Device Ratio table.

In calculating PM complement pollutants, priority was given to calculating –PRI and –CON pollutants. FIL pollutants were only calculated if necessary to calculate other pollutants or if it was a by-product of this calculation.

In augmenting the PM pollutants the non 10* and 20* SCCs were augmented first, with order given to augmenting based on PM_{10} where available, PM_{25} where available, and then PM .

Augmenting the PM pollutants for the 10* and 20* SCCs is more complicated, but the basic approach was to augment based on PM_{10} (FIL or PRI) where available, $PM_{2.5}$ (FIL or PRI) where available, and then PM (FIL or PRI) if PM_{10} or $PM_{2.5}$ variations were not available. Where both PM_{10} (FIL or PRI) and $PM_{2.5}$ (FIL or PRI) variations were both available, the calculation for

PM-CON was generally driven from the PM_{10} number and the complements as necessary were back calculated. Where a –PRI emission factor ratio was required and was not available the –FIL emission factor ratio was used.

After calculations, the data was QA checked to ensure that the calculations resulted in consistent values for the PM complement. On a few occasions, the mix of ratio value and the pollutants and values provided by the S/L/T agency resulted in negative values when –FIL was back-calculated. In this case the negative –FIL value was set to zero and the –PRI value was readjusted.

The resultant PM table has the format described in Table 6.

4.   Presentation of PM Augmentation for S/L/T Agencies to Review and Comment

The table described in Step 3 was provided for the S/L/T agency to review in the *PM Augmentation Draft*) . In addition to this table, if there were any remaining QA issues these were listed in the QA table in this database.

Note: There are some high condensible ratios that were calculated for some SCC device type combinations. In most cases these high condensible ratios were the result of the back calculation of PM-CON from PM10-PRI or PM25-PRI records. Since the state had already provided the PMxx-PRI records, these PM-CON values were not added to the inventory.

The data source code field was used to identify records that were added to the inventory to complete the set of PM10-PRI and PM25-PRI emissions.

c.   ERP Coordinates

If a S/L/T agency did not provide corrections for ERP coordinates that map more than 5 kilometers outside of the county boundary, or provide coordinates for ERP records that did not have any coordinates in the S/L/T inventory, the following procedures were applied to replace the coordinates:

- Coordinates for other ERPs at the same facility, if available, that map within the county;
- Coordinates for the centroid of the zip code for a facility if a valid zip code is provided or can be obtained from the agency if it is not valid; or
- County centroid coordinates.

Table 6. Description of the Field Names and Descriptions for the Resulting PM Augmentation Table

Field Name	Field Description
Augment	A "Yes" in this field indicates that the process PM was augmented.
Condensible Note	If condensible information was added this field will note that.
STATE_FIPS	State FIPS
COUNTY_FIPS	County FIPS
STATE_FACILITY_IDENTIFIER	Site ID
EMISSION_UNIT_ID	Emission Unit
PROCESS_ID	Process
START_DATE	Start Date
END_DATE	End Date
EMISSION_TYPE	Emission type
SCC	Source Category Code
SCC_DESC	SCC description
PRIMARY_DEVICE_TYPE	Primary Device Type
PRIMARY_DEVICE_TYPE_DESC	PDT description
SECONDARY_DEVICE_TYPE	Secondary Device Type
SECONDARY_DEVICE_TYPE_DESC	SDT description
EMISSION_TYPE_PERIOD	Emission Type Period
EMISSION_RELEASE_POINT_ID	Emission Release Point ID
FACILITY_NAME	Facility Name
ORIS_FACILITY_CODE	ORIS facility Code
SIC_PRIMARY	SIC
ACTUAL_THROUGHPUT	Actual Throughput
THROUGHPUT_UNIT_NUMERATOR	Throughput Unit Numerator
PM_PRI	Emission ton value for PM-PRI
PM_FIL	Emission ton value for PM-FIL
PM10_PRI	Emission ton value for PM10-PRI
PM25_PRI	Emission ton value for PM25-PRI
PM10_FIL	Emission ton value for PM10-FIL
PM25_FIL	Emission ton value for PM25-FIL
PM_CON	Emission ton value for PM-CON
PM_PRI_EXISTS	0 if the S/L/T agency did not provide, > 0 if S/L/T agency did provide
PM_FIL_EXISTS	0 if the S/L/T agency did not provide, > 0 if S/L/T agency did provide
PM10_PRI_EXISTS	0 if the S/L/T agency did not provide, > 0 if S/L/T agency did provide
PM25_PRI_EXISTS	0 if the S/L/T agency did not provide, > 0 if S/L/T agency did provide
PM10_FIL_EXISTS	0 if the S/L/T agency did not provide, > 0 if S/L/T agency did provide
PM25_FIL_EXISTS	0 if the S/L/T agency did not provide, > 0 if S/L/T agency did provide
PM_CON_EXISTS	0 if the S/L/T agency did not provide, > 0 if S/L/T agency did provide
RECORD_COUNT	0 if the S/L/T agency did not provide, > 0 if S/L/T agency did provide
System Update Note	This field contains system codes related to the update queries used to calculate the record.

The zip code was taken from the SI NIF 3.0 table. The zip code was compared to a reference table of valid zip codes to verify that it is an active zip code and exists in the state and county reported in the inventory. If a valid zip code for a facility was not identified, the centroid for the facility's county was used as a last resort. In some cases, the S/L/T agency provided confirmation that the S/L/T coordinates were correct even if the analysis indicated that the coordinates were outside of the county boundary (generally in the case of offshore facilities). These coordinates were not changed. Additionally, all coordinates were converted to latitude/longitude measurements.

d.   ERP Parameters

If valid ERP parameters were not provided by the S/L/T agency, Pechan applied the ERP augmentation procedures for the 2002 point source NEI (EPA, 2004b). It has been determined that the augmentation procedures in this document regarding SCC-specific ERP types and temperatures may be difficult to resolve. When this situation occurred, preference was given to the S/L/T agency-supplied ERP type and SCC. For example, the procedures did not account for cases where an emission unit had two processes with one defined as a stack source and the other as a fugitive source. Therefore, the S/L/T-supplied ERP type was used when this situation occurred. If the ERP type was null, and information was not available from the S/L/T agency, the stack height information was used as a guide. If stack height information was available, the ERP was treated as a stack, or, if stack height information was not available, the ERP type was treated as a fugitive. Additionally, there were occasional typographical errors resolved where the ERP type digits were transposed '20' instead of '02'; these were resolved. An additional modification to the augmentation procedure was also implemented. Since, in many cases, null values were filled in with zeros by S/L/T agency databases when comparing out-of-range velocities and flows (after it was determined that the stack and diameter information was correct) – null and zero values were treated in the same manner to prevent inappropriate replacement of stack parameter values. Additionally, stack parameter values were rounded to 1 decimal place when compared to range values (just for the purposes of comparison) to prevent replacement of S/L/T parameter values based on negligible decimal differences.

e.   Control Device Type and Control Efficiency Data

Control efficiency values of 100% and rule effectiveness values of 100% with non-zero emissions were diagnosed as potential errors and sent to the S/L/T agencies. Where possible the data were updated with S/L/T corrections. Decimal control efficiencies were also diagnosed and sent to the S/L/T agencies. A decimal control efficiency value usually indicated that the control efficiency was not entered as a percentage value as is required by NIF 3.0. Where possible the data were updated with S/L/T corrections (See Section II.B.2 above).

f.   SCC Data

S/L/T agencies were provided with lists of invalid or inactive SCCs. Where the S/L/T agencies were able to provide valid SCC information this was updated with S/L/T agency information. Where S/L/T agencies were unable to provide valid SCC information, the proposed mapping information provided was used to update the S/L/T agency information.

In some cases, the SCC issues were not forthcoming until further into the processing than the initial QA stages. This occurred in cases of late data submissions, and the generation of parent EP records for EM records. In this case, SCCs were replace with the following approach:

- Where the SCC was invalid and mapping was available the SCC was changed to the mapping SCC;
- Where the mapping SCC was not available a more generic code was selected;
- Where the SCC was truncated a generic code was selected;

- Where the SCC was still unavailable the NEI 1999 Version 3 was used as a source;
- Where still unavailable – the most generic of the existing SCCs for the emission unit was used; or
- Where still unavailable – the most generic of the existing SCCs for the facility was used.

This second approach affected 529 records.

g.   SIC Data

There were some overall changes made to SIC data – for SICs that had been provided as 0200 these were changed to 02 which is considered a valid SIC by the EPA QA program. Also, in order to provide a better basis for the stack augmentation procedure, missing SIC codes were filled in using the lowest numerical value based on the NAICS to SIC code crosswalk.

5.   Revisions to Address Comments

The following items were revised per state instruction during S/L/T agency review of the draft point source inventory:

a.   Missouri

Missouri supplied new stack parameter information. Their stack parameters were updated and the stack augmentation procedure was reapplied. The Access database "Missouri_Stack_Updates_200501.mdb" contains the changes.

b.   Nebraska-Omaha

NH_3 emissions were revised from 584.78 tons per year to 1.57 tons per year for Nebraska-Omaha facility 0002 - the Omaha Public Power District - North Omaha Power Station.

c.   Minnesota

Per Minnesota's request, SCC 30302301 (- crushing) was changed to SCC 30302312 (-pellet induration) for the following facility, emission unit, and processes:

Facility Name: Ispat Inland Mining Company
State Facility ID: 2713700062
Emission Unit ID: EU026
Process IDs: 001, 004, 007, and 010

d.   Texas and Missouri Daily Emissions

State daily emissions data for Texas and Missouri are included in the SMOKE input files for the CENRAP inventory. For the NIF 3.0 files, the daily emissions are provided in a file called "CENRAP_Point_Daily_Missouri_Texas_20050216.mdb."   A daily emissions record **was**

included in the file only if it had an associated annual emissions record. In addition to the Daily EM and PE records, a table called "Daily Values GT Accompanying Annual Values" was included in the database that lists records with a daily emission value that is greater than the annual emission value. In the overwhelming majority of cases this situation occurred when the daily emission value was very small and recorded in pounds and the annual value was zero and recorded in tons. In many cases, in the originating emission inventory application, emission values are rounded. Therefore, the annual ton value was rounded to zero.

6.   QA Review of Final Inventory

Final QA checks were run on the revised point source inventory data set to ensure that all corrections provided by the S/L/T agencies were incorporated into the S/L/T inventories and that there were no remaining QA issues that could be addressed during the duration of the project. After exporting the inventory in Oracle to an Access database in NIF 3.0, the EPA QA program was run on the Access database and the QA output was reviewed to verify that all QA issues that could be addressed were resolved (EPA, 2004a)

This file accompanies this documentation with the specific details included. The following summarizes the remaining QA issues that could not be addressed during the duration of this project (listed by table):

CE

Primary device type codes were not provided by all of the modeled inventories, specifically CAFOs and prescribed burning; it should be determined if there is an appropriate generic primary device type to be used or whether the CE records should be removed.

In the MN prescribed burning inventory, a NIF 3.0 formatting error resulting in a shift of the data which place the submittal flag of A in the third primary device column (as well as other shifts). This has no effect on the data performance, but it is noted as a potential cleanup issue.

EM

The EPA QA checker indicated that some emissions were outside the normal expected range. While this is a guideline and not a specific fault, this listing could be reviewed for specifically high values.

CH_4, EC, and OC were flagged as errors since these values are not in the EPA pollutant code table.

PE

There are a few records with the units M2 and MASS that were not in the EPA QA checker table. It could be determined if these values should be added, or whether there are appropriate substitutes.

There are a few remaining records with operating times outside the EPA QA Checker ranges.

EP

There are a few remaining records with operating parameters and seasonal sums outside the normal expected range.

The SCC 30202000 has not yet been added to the EPA QA Checker SCC database.

ER

A significant number of records are missing the supplementary coordinate reference information (Horizontal data measure, horizontal data accuracy, horizontal collection method code).

A number of records indicate coordinates outside of county boundaries – the reasons why this may occur were explained in the coordinate augmentation section earlier in this document.

A number of records also indicate stack parameters outside of ranges expected by the EPA QA checker. This is due either to the S/L/T agency specifically requesting not to change the values or to default values in the EPA table which fall outside of the EPA QA Checker ranges.

EU

SIC code 3041 is not in the SIC codes table.

SI

The modeled inventories (particularly the NH_3 and CAFO inventories) did not provide zip code information with the site data. This accounts for a tremendous number of the invalid zip code errors found when running the EPA QA checker. There are other records with zip code errors in addition to these; however, these inventories are the source of the majority of these errors.

NAICs codes are missing on some records.

TR

REPORT_CERTIFIER should be corrected to REPORT CERTIFIER.

Some records are missing the transaction creation date information.

C. Area Source Inventory Methods

1. Data Sources

For each S/L/T inventory submitted to EPA, Table 7 provides a summary of the number of counties and the pollutants included in each S/L/T inventory. For comparison purposes, the table shows the number of counties in each area source inventory included in the 2002 preliminary NEI and the number of counties in each state.

The states of IA and LA did not submit an area source inventory for the CAPs. For the state of NE, the data shown in Table 7 are from its area source inventory submittal to EPA. However, NE's area source inventory contained emissions for small point sources and NE subsequently moved the small point sources to the its point source inventory. IA, LA, NE, and OK requested that the 2002 preliminary NEI be used for their area source inventory for the CAPs except for categories (i.e., prescribed burning, agricultural burning, and agricultural dust) for which they requested that the CENRAP-sponsored inventory be used instead of the NEI. The NH_3 inventories that IA and LA submitted to EPA were maintained in the CENRAP inventory. In addition, Omaha did not submit an area source inventory; therefore, the 2002 preliminary NEI was used as the area source data for the CENRAP inventory for Omaha. OK's original inventory submittal to EPA was a copy of the 2002 preliminary NEI, but the emission values were rounded to two decimal places. OK's inventory was updated with the unrounded emission values in the 2002 preliminary NEI (February 2004 version).

The area source inventories obtained from EPA were loaded into Oracle in NIF 3.0 into one data set. Then, the following updates were performed on the consolidated data set, if necessary:

- HAP records were removed since the inventory will support regional haze, fine PM, and ozone modeling.

- Pollutant codes were corrected to make them NIF 3.0 compliant (e.g., update PMPRI pollutant code to PM-PRI). Additionally, other codes were identified for remediation on a case-by-case basis.

- Records with a submittal flag indicating deletions (submittal_flag = 'D' or 'RD') were removed from the inventories.

- Null values in the tribal code field were updated to '000' since this field is a part of the data key that defines records as unique in all five NIF tables.

Table 7. Summary of Pollutants and Number of Counties Included in Area Source Inventories

State/Local/Tribal Agency	CO	NH₃	NOₓ	PM-PRI	PM10-PRI	PM25-PRI	PM10-FIL	PM25-FIL	PM-CON	SO₂	VOC	Number of Counties in 2002 S/L/T Inventory	Number of Counties in 2002 Preliminary NEI	Number of Counties in State
AR	x	x	x		x	x				x	x	75	75	75
IA		x										99	99	99
KS	x	x	x		x	x				x	x	105	105	105
LA		x										64	64	64
MN	x	x	x		x					x	x	87	87	87
Fond du Lac Band of the Minnesota Chippewa Tribe	x		x	x	x					x	x	NA[1]	NA	NA
MO	x	x	x		x	x				x	x	115	115	115
NE-State	x	x	x		x		x			x	x	79	93	93
NE-Lincoln (Lancaster County)	x	x	x		x	x				x	x	1	1	93
NE-Omaha (Douglas County)[2]												1	1	93
OK	x	x	x		x	x	x	x	x	x	x	77	77	77
TX	x	x	x		x	x	x	x	x	x	x	254	254	254

[1] NA = Not Applicable.

[2] Omaha's area source inventory is included in the state of NE's inventory submittal. Omaha did not submit its own area source inventory to EPA.

The following NIF plus fields were added to the EP, PE, EM, and CE tables:

- Data Source Codes:

For the area and nonroad inventory data, the data source codes were based on the following 9-character format:

[Data Origin]-[Year]-[Grown/Not Grown/Carried Forward]-[PM Augmentation Code]

Code	Field Length
Data Origin	1
Year	3 (including leading hyphen)
Grown/Not Grown/Carried Forward	2 (including leading hyphen)
PM Augmentation	3 (including leading hyphen)

Data Origin Codes

Code	Description
S	State agency-supplied data
L	Local agency-supplied data
R	Tribal agency-supplied data
P	Regional Planning Organization-generated data
E	EPA/Emission Factor and Inventory Group (EFIG)-generated data

Year Codes

Year for which data were supplied (e.g., Year = -02 for 2002), or from which prior year data were taken (e.g., Year = -99 for 1999; -01=2001).

Grown/Carried Forward/Not Grown Codes

Code	Description
-G	Used when emissions in a pre-2002 inventory were grown to represent 2002 emissions.
-F	Used when emissions in a pre-2002 inventory were carried forward and included in the 2002 inventory without adjustment for growth.
-X	Used when the emissions were not grown or were not carried forward. For example, X was used when emissions were calculated for the 2002 inventory using 2002 activity, or when data were replaced with 2002 S/L/T data.

PM Augmentation Codes

-PA	PM Augmented Emissions: Record for $PM_{10}/PM_{2.5}$ emissions that were updated or added using ad-hoc updates.

-PC   PM Augmented Emissions: Record added for $PM_{10}/PM_{2.5}$ emissions estimated using the PM Calculator.

-PR   PM Augmented Emissions: Record added for $PM_{10}/PM_{2.5}$ emissions estimated using ratios of PM_{10}-to-PM or $PM_{2.5}$-to-PM_{10}. If PM_{10} and $PM_{2.5}$ emissions were equal and one of the pollutants was assigned this code, the ratio was assumed to be 1.

2 QA Review

QA review was conducted on the S/L/T area source inventories in accordance with the QA procedures specified in the QAPP for this project (CENRAP, 2004b). The following discusses the QA checks that were completed during preparation of the consolidated data set.

a. *County and SCC Coverage*

The county coverage in the state inventories appeared to be reasonable for all states. The SCC coverage was difficult to evaluate simply by showing a count of the number of SCCs by state. Each S/L/T inventory was compared to the preliminary 2002 NEI, and area source categories in the NEI but not in a S/L/T inventory was sent to each agency for review. Each S/L/T agency then selected the NEI categories that were then added to the CENRAP inventory.

b. *Pollutant Coverage*

The pollutant coverage in the S/L/T inventories was complete for all pollutants except for PM_{10} and $PM_{2.5}$. Diagnosis and resolution of PM_{10} and $PM_{2.5}$ pollutant emissions is discussed later in section II.C.4.

c. *EPA QA Summaries Sent to S/L/T Agencies*

Under a separate project with EPA, Pechan performed QA review of the S/L/T area source inventories. This QA review involved running EPA's QA program on each data set to identify and resolve QA issues. Using the results of this QA work, Pechan prepared two sets of QA summaries that EPA sent to the S/L/T agencies. Pechan contacted each S/L/T agency with QA issues. The following explains these two summaries:

High-level Summary of S/L/T Inventories Submitted to EPA:

The first summary was an Excel workbook file with four spreadsheets that provided the following information:

- 2002 Nonpoint File Names: This spreadsheet documented names and formats of the files that EPA received from the S/L/T agencies and the dates on which they were transferred to Pechan.

- 2002 Nonpoint Summary: This spreadsheet documented the jurisdiction of the submitting agency (i.e., S/L/T agency), type of inventory (i.e., criteria, HAP, or

both), a comparison of the number of the counties in the inventory to the total number of counties in the state to identify the geographic coverage of the inventory, a unique list of CAP codes, and the total number of area source SCCs. This spreadsheet also indicated if any nonroad or onroad emissions data were moved from the agency's area source inventory to its nonroad or onroad inventory).

- 2002 Nonpoint Emission Sums: This spreadsheet summarized emissions by start date, end date, and emission type and assigned the appropriate code to the emission type period NIF plus field.

- 2002 Nonpoint Error Summary: This spreadsheet provided a copy of the "SummaryStats" table from the EPA QA program (EPA, 2004a). This table provided the count of records for each NIF 3.0 table and identified the number of records with errors by type of error.

Detailed Summary of QA Issues:

This summary (sent to S/L/T agencies on August 11) was prepared in a text file that listed by state and NIF table the number of records with errors, and provided corrections for the errors. To support documentation of corrections to some of the errors in the text file, Pechan prepared an Excel workbook file that summarized the following errors and corrections by state: invalid pollutants codes; invalid units; invalid maximum achievable control technology (MACT) codes; and invalid and inactive SCCs. A spreadsheet was also included to show the mapping of Standard Industrial Classification (SIC) codes to North American Industrial Classification System (NAICS) codes. This crosswalk was used to correct invalid NAICS codes if a valid SIC code was available in the S/L/T inventories and vice versa.

> ### d.   Additional QA for the CENRAP Area Source Inventory

The following explains additional QA and data tracking that was performed for the CENRAP inventory. The following data elements were reviewed to identify QA issues:

- Range Errors;
- PM Emissions Consistency and Completeness;
- Control Device Codes and Control Efficiency Values;
- Start and End Dates;
- Annual and Daily Emissions Comparison; and
- Comparison of S/L/T Inventories to the 2002 Preliminary NEI.

For each S/L/T inventory for which QA issues were identified, a separate QA Summary Report was prepared in an Excel Workbook file, and sent to each S/L/T agency for review. The S/L/T agencies provided directions in the Excel Workbook file, via e-mail, or by submitting revised records in NIF 3.0 in an Access database to correct the inventories. The QA reports are discussed under section II.C.3.

Range Errors

The EPA's QA program contains routines that compare annual emission values, numeric fields in the PE and EP tables, and other temporal numeric fields against a range of values. The QA program flags records that are less than or greater than the range of values for review. Pechan summarized the range errors for the S/L/T agencies to review and provide corrections. According to EPA, the ranges to which values in inventories are compared represent "normal" ranges that are based on percentiles from previous inventories. The range values are conservative in that EPA wants to identify suspicious values even though the values may be real (Thompson, 2002).

PM Emissions Consistency and Completeness Review

The following consistency checks were performed at the EM table data key level (for annual emissions) to compare PM emissions:

- If an SCC was associated with a PM emission record, but was missing one or more of the following (as appropriate for the SCC [i.e., PM-CON is associated with fuel combustion only]): PM10-FIL, PM10-PRI, PM25-FIL, PM25-PRI, or PM-CON, the record was flagged for review.

- The following equations were used to determine consistency:

$$PM10\text{-}FIL + PM\text{-}CON = PM10\text{-}PRI$$
$$PM25\text{-}FIL + PM\text{-}CON = PM25\text{-}PRI$$

- The following comparisons were made to determine consistency:

$$PM10\text{-}PRI >= PM10\text{-}FIL$$
$$PM25\text{-}PRI >= PM25\text{-}FIL$$
$$PM10\text{-}PRI >= PM\text{-}CON$$
$$PM25\text{-}PRI >= PM\text{-}CON$$
$$PM10\text{-}FIL >= PM25\text{-}FIL$$
$$PM10\text{-}PRI >= PM25\text{-}PRI$$

If the data failed one of these checks it was diagnosed as an error. If a S/L/T agency did not provide corrections to these errors, the errors were corrected/filled in according to an augmentation procedure explained in section II.C.4.

For information purposes, all PM-PRI and PM-FIL records were flagged to indicate that these pollutants were included instead of, or in addition to, the standard PM_{10}, $PM_{2.5}$, and PM-CON pollutants.

Control Device Type and Control Efficiency Data Review

The control equipment codes in the "Primary Device Type Code" and "Secondary Device Type Code" fields were reviewed to identify invalid codes (i.e., codes that did not exist in the NIF 3.0 reference table) and missing codes (e.g., records with a null or uncontrolled code of 000 but with control efficiency data).

QA review of control efficiency data involved diagnosis of two types of errors. First, records were reviewed to identify control efficiency values that were reported as a decimal rather than as a percent value. Records with control efficiencies with decimal values were flagged as a potential error (although not necessarily an error, since the real control efficiency may be less than 1 percent). Records with a 1% control efficiency value were also identified for review by the S/L/T agency to determine if the value was reported as a decimal in its internal data system but rounded to 1% when the data were converted to NIF 3.0.

The second check identified records where 100% control was reported in the CE table, but the emissions in the EM table were greater than zero and the rule effectiveness value in the EM table was null, zero, or 100% (implying 100 percent control of emissions). Because many agencies did not populate the rule effectiveness field or a default value of zero was assigned, records with null or zero rule effectiveness values were included where the CE was 100% and emissions were greater than zero. For records that met these criteria, Pechan consulted with the S/L/T agency to determine if corrections were needed to any of the fields.

Start and End Date Checks

QA review was conducted to identify start and end date values in the PE and EM tables to confirm consistency with the inventory year in the transmittal table, and to confirm that the end date reported was greater than the start date reported.

Annual and Daily Emissions Comparison

The S/L/T inventories were reviewed to determine if any of the following conditions existed:

- Multiple records coded at the SCC level as emission type 30, but with different start and end dates. While not a true duplicate, this may indicate an error or inclusion of both annual and seasonal values.

- Multiple records coded at the SCC level as a daily emission type (27, 29, etc.) but with different start and end dates. While not a true duplicate, this may indicate an error or just inclusion of additional types of daily emissions.

- Multiple records coded at the SCC level with the same start and end date, but different emission types. While not a true duplicate, this may indicate an error or just inclusion of additional types of daily emissions.

- Any "DAILY" type record that was missing its associated "ANNUAL" record was flagged for review.

- Any "DAILY" type record that was greater than its associated "ANNUAL" record was flagged for review.

3. Responses from State, Local, and Tribal (S/L/T) Agencies

QA Summary Reports were sent to the S/L/T agencies to review the QA issues identified. The S/L/T agencies were asked to return these reports to CENRAP with their corrections documented in the reports. These reports were then used to document revisions to the S/L/T inventories. The QA Summary Reports containing the revisions provided by the S/L/T agencies are provided in Excel Workbook files with this report. The names of the files are provided in Table 8. Note that a QA Summary Report was not prepared for NE and OK since the area source inventory for these two states is a copy of the 2002 NEI. OK provided an inventory for SCC 2310000000 (Industrial Processes / Oil and Gas Production: SIC 13 / All Processes / Total: All Processes) for VOC, NO_x, and CO that was incorporated into the CENRAP inventory.

Table 8. QA Summary Reports for S/L/T Area Source Inventories

S/L/T Agency	Excel Workbook File Name of QA Summary Report
AR	AR_NP_QA_Report_092404.xls
Fond du Lac Band of the Minnesota Chippewa Tribe	Fonddulac_NP_QA_Report_083004.xls
IA	IA_NP_QA_Report_090204.xls
KS	KS_NP_QA_Report_090104.xls
LA	LA_NP_QA_Report_090304.xls
MN	MN_NP_QA_Report_092304.xls
MO	MO_NP_QA_Report_091704.xls
NE - Lancaster County (Lincoln)	NE_Lancaster_NP_QA_Report_082704-approved.xls
TX	TX_NP_QA_Report_090904_v3.xls

The first spreadsheet in each QA Summary Report defines the remaining spreadsheets in the Excel Workbook file and provides instructions for communicating revisions. Table 9 provides a list of the QA summaries (note that a spreadsheet was not included in an agencies report if there were no QA issues).

Table 9. Summary of Spreadsheets Provided in QA Summary Reports for Area Source Inventories

Name of Spreadsheet	Content/Instructions
Summary Stats	This spreadsheet is a copy of the "SummaryStats" table generated by the EPA's QA program. This shows the results of running the QA program on the August 6 version of the area source inventory files EPA provided to the S/L/T agencies after correcting referential integrity and duplicate record issues.
Lookup Errors	This spreadsheet provides a unique list of NIF 3.0 reference table "Lookup Errors" identified by the EPA's QA program. The S/L/T agency should provide corrections to the lookup errors or indicate in the "Approved" column in this spreadsheet if it accepts the correction provided in the "Correction" Column.
Range Errors	This spreadsheet details the range errors identified by the EPA's QA program.
Emission Type Period	This spreadsheet identifies EM table records as containing annual, seasonal, or daily emissions in the NIF plus field named "Emission Type Period." This NIF plus field, once populated, will be used to prepare emissions summaries on a consistent temporal basis.
PMx Issues1	This spreadsheet documents the results of QA review conducted on PM10 and PM2.5 emissions as required by the Quality Assurance Project Plan (QAPP) and Draft Methods Document for this project.
PMx Issues2	This spreadsheet provides additional details regarding PM10 and PM2.5 QA issues referred to in the "PMx Issues1" spreadsheet.
NEI Categories not in State EI	The spreadsheet provides a unique list of the SCCs in the preliminary 2002 NEI that did not appear in the agency's inventory submittal to EPA. The spreadsheet shows the number of counties in which the SCC appears in the NEI, and provides the NEI annual emissions in tons. See the "State to NEI Comparison" spreadsheet for detailed comparison at state level to help identify the NEI categories to add or exclude from your inventory in this "NEI Categories not in State EI" spreadsheet. This spreadsheet does not include: 1. SCCs in the NEI that electronically match on the state and county FIPS and SCC in the agency's inventory; and 2. SCCs in the NEI that are different than the agency's SCC but for the same category. For example, if an agency uses a general SCC for a category and the NEI uses SCCs that provide more detail, the SCCs in the NEI are not included in this spreadsheet. The agency should review the spreadsheet to make sure that all double counting of emissions between the agency's inventory and the NEI has been eliminated.
State to NEI Comparison (provides additional data to supplement the data in the "NEI Categories not in State EI" spreadsheet)	This spreadsheet compares the SCCs in the S/L/T inventory to the SCCs in the 2002 preliminary NEI at the state-level. The number of counties that appear for each SCC in your state is also provided. This spreadsheet should be used to help make decisions on the NEI categories you want added and excluded from the list provided in the "NEI Categories not in State EI" spreadsheet.

4. Gap Filling and Augmentation

The following discusses the augmentation procedures that were applied to the S/L/T inventories to improve the inventories or to fill in missing data not supplied by the S/L/T agencies.

a. CENRAP-Sponsored Inventories

CENRAP sponsored inventory development for source categories of NH_3 and planned burning (i.e., prescribed burning, rangeland burning, and agricultural field burning) and agricultural dust area source categories. For each of these categories, each S/L/T agency was requested to complete a table to indicate if it (1) included the CENRAP-sponsored inventory in the inventory it submitted to EPA; (2) included its own estimates for a category in the inventory it submitted to EPA; or (3) if it did not include a category in its inventory, if the CENRAP-sponsored inventory or the 2002 preliminary NEI should be used as the source of data for the category. The results of this request are summarized in Table 10.

Table 10. Summary of CENRAP-Sponsored Inventories Included in the Area Source Consolidated Emissions Inventory

Area Source Category	SCCs	CENRAP Inventory Included in S/LT Inventory Submitted to EPA Monthly	S/L/T Inventory Used Instead of CENRAP Inventory Annual	Summer Day	Winter Day	CENRAP Inventory Added to S/L/T Inventory Annual	Preliminary NEI Used Instead of CENRAP Inventory Annual
Planned Burning Inventories (pollutants included in S/L/T inventories are listed at the bottom of this table)[1]							
Prescribed Burning for Forest Management	2810015000		AR; TX; Lancaster County, NE; Tribal	AR, TX	AR, TX	IA, KS, LA, MN, MO, NE (state), OK	
Prescribed Burning of Rangeland	2810020000		TX; Lancaster County, NE	TX		IA, KS, LA, MN, MO, NE (state), OK	
Agricultural Field Burning	28015001xx; 28015002xx		AR; TX; Lancaster County, NE	TX		IA, KS, LA, MN, MO, NE (state), OK	
Fugitive Dust Inventories For PM10-PRI and PM25-PRI							
Agricultural Crop Tilling, Harvesting, and Other Activities	2801000003		AR	AR	AR	IA, KS, LA, MN, MO, NE (state), OK, TX	
NH₃ Inventories[2]							
Animal Husbandry (Livestock)	28050xxxxx	IA, KS, LA, MO	AR, TX	TX	TX	MN; NE (state); Lancaster County, NE; OK	
Agriculture Fertilizer Application	28017000xx	IA, KS, LA, MO	AR, TX			MN; NE (state); Lancaster County, NE; OK	
Food and Kindred Products - Refrigeration	2302080002	IA, KS, LA, MO	AR			MN, NE (state), OK	
Municipal Landfills	2620030000	IA					
Public Owned Treatment Works	2630020000	KS, MO	TX	TX		MN; NE (state); Lancaster County, NE; OK	IA, LA
Other Combustion - Forest Wildfires	2810001000	MO	KS, TX	KS, TX		MN	IA; LA; NE (state); Lancaster County, NE; OK

Table 10 (continued)

Area Source Category	SCCs	CENRAP Inventory Included in S/LT Inventory Submitted to EPA	S/L/T Inventory Used Instead of CENRAP Inventory			CENRAP Inventory Added to S/L/T Inventory	Preliminary NEI Used Instead of CENRAP Inventory
		Monthly	Annual	Summer Day	Winter Day	Annual	Annual
Other Combustion - Human Perspiration and Respiration	2810010000	IA, KS, LA, MO	AR, TX	AR, TX	AR	MN; NE (state); Lancaster County, NE; OK	
Domestic Animals Waste	280601xxxx	IA, KS, LA, MO	TX	TX		MN; NE (state); Lancaster County, NE; OK	
Wild Animals Waste	28070xxxxx	IA, KS, LA, MO	TX	TX		MN; NE (state); Lancaster County, NE; OK	
Natural Sources/Biogenic (Vegetation/Forests /Land Use)	2701xxxxxx	IA, KS, LA	TX	TX		NE (state), OK	
Light Duty Gasoline Vehicles	2201001000	IA, KS, LA					
Light Duty Diesel Vehicles	2230001000	IA, KS, LA					

[1] The following identifies the pollutants included in the planned burning inventories by S/L/T agency:

Prescribed Burning for Forest Management
AR: CO, NO_x, VOC, PM10-PRI, PM25-PRI
Fond du Lac Band of the MN Chippewa Tribe: CO, PM-PRI, PM10-PRI, PM25-PRI
IA, KS, LA, MN, MO, OK; NE (state); Lancaster County, NE: CO, NO_x, NH_3, SO_2, VOC, PM10-PRI, PM25-PRI
TX: CO, NO_x, NH_3, SO_2, VOC, PM10-PRI, PM10-FIL, PM25-PRI, PM25-FIL

Prescribed Burning of Rangeland
IA: CO, NO_x, SO_2, VOC, PM10-PRI, PM25-PRI
KS; LA; MN; MO; OK; NE (state); Lancaster County, NE: CO, NO_x, NH_3, SO_2, VOC, PM10-PRI, PM25-PRI
Lancaster County, NE: CO, NO_x, PM10-PRI, PM25-PRI
TX: CO, NO_x, NH_3, VOC, PM10-PRI, PM10-FIL, PM25-PRI, PM25-FIL

Agricultural Field Burning
AR: CO, VOC, PM10-PRI, PM25-PRI
IA, KS, LA, MN, MO, OK; NE (state); Lancaster County, NE: CO, NO_x, NH_3, SO_2, VOC, PM10-PRI, PM25-PRI
TX: CO, NO_x, NH_3, VOC, PM10-PRI, PM10-FIL, PM25-PRI, PM25-FIL

[2] The CENRAP-sponsored NH_3 inventories were prepared for monthly emissions. The monthly emissions were summed to calculate annual emissions. The annual emission records were added to the area source inventory to support preparation of emission summaries.

b.   PM Augmentation

Procedures were developed to estimate missing pollutant data from data provided by the S/L/T agencies in order to develop a complete set of PM10-PRI and PM25-PRI emissions to support air quality modeling. The following discusses the procedures for fossil fuel combustion and residential wood combustion sources first followed by the procedures for all other area sources of PM emissions.

Fossil Fuel Combustion Sources

Fossil fuel combustion sources include industrial, commercial/institutional, and residential anthracite coal, bituminous/subbituminous coal, distillate oil and kerosene, residual oil, natural gas, and liquefied petroleum gas (LPG). All of these sources emit both filterable and condensible emissions. The QA review of the PM emissions data for these sources focused on verifying that the emissions reported in the S/L/T inventories included both filterable and condensible emissions. The emissions for these pollutants can be reported individually (i.e., as filterable and condensible separately) or as primary emissions (i.e., the sum of the filterable and condensible emissions). The QA review also focused on evaluating the emission factors reported in the S/L/T inventories to determine if they were reasonable.

To support the QA review effort, the uncontrolled PM emission factors shown in Table 11 were compiled from AP-42. The emission factors reported in the S/L/T inventories were compared to the emission factors in this table. Emission factors that appeared too high or too low were flagged for review by the S/L/T agency. In addition, inventory data were flagged for review by the S/L/T agency if the emissions were reported under the primary PM pollutant codes but the emission factors matched with the emission factors for filterable PM in Table 11. Finally, if emission factors were not reported in the S/L/T agency inventory, the emission factors were back-calculated using the throughput data (if available), emissions, rule effectiveness values, and control efficiency data (if available). The back-calculated emission factors were compared to the factors in Table 11 to identify data with major difference between the factors. It is emphasized that the uncontrolled emission factors in Table 11 were used as a reference for reviewing S/L/T inventory data. The emission factors in this table should not be construed to be the best available for all S/L/T agencies since the emission factors will vary depending on the composition of the boiler population in an agency's area source inventory.

The states of IA, KS, LA, NE, and OK used the fossil fuel combustion inventory in the preliminary 2002 NEI for the CENRAP inventory. Revisions to the NEI for residential LPG and kerosene were completed after the preliminary 2002 NEI was released in February 2004; the revised inventories for these two categories were included in the CENRAP inventory for IA, KS, LA, NE, and OK.

AR, MN, and TX provided their own inventory for all fossil fuel combustion categories. AR's inventory reported filterable emissions under the primary pollutant code, but AR corrected its inventory and provided updates to the CENRAP inventory.

Table 11. Area Source Industrial, Commercial/Institutional, and Residential Fossil Fuel Combustion Uncontrolled Emission Factors for PM10-PRI/FIL, PM25-PRI/FIL, and PM-CON

Pollutant[1]	Uncontrolled Emission Factor (EF)	EF Numerator	EF Denominator	Calculated Uncontrolled EF	Reference
Industrial Boilers: Anthracite Coal (SCC 2102001000)					
PM10-FIL	2.3	LB	TON	30.77	AP-42 Table 1.2-4 EF calculated from formula of 2.3 * % Ash Content (13.38%). Reference for ash content is EPA, 2002.
PM25-FIL	0.6	LB	TON	8.03	AP-42 Table 1.2-4 EF calculated from formula of 0.6 * % Ash Content (13.38%) (used Commercial/Institutional emission factors). Reference for ash content is EPA, 2002.
PM-CON	0.08	LB	TON	1.07	AP-42 Table 1.2-3 Used formula for SCC 10300101, EF calculated from formula of .08 * % Ash Content (13.38%). Reference for ash content is EPA, 2002.
PM10-PRI		LB	TON	31.84	
PM25-PRI		LB	TON	9.10	
Industrial Boilers: Bituminous/Subbituminous Coal (SCC 2102002000)					
PM10-FIL	13.2	LB	TON	13.2	AP-42 Table 1.1-9 EF (used Commercial/Institutional emission factors)
PM25-FIL	4.6	LB	TON	4.6	AP-42 Table 1.1-9 EF (used Commercial/Institutional emission factors)
PM-CON	1.04	LB	TON	1.04	AP-42 Table 1.1-5 (used Commercial/Institutional emission factors)
PM10-PRI		LB	TON	14.24	
PM25-PRI		LB	TON	5.64	
Industrial Boilers and IC Engines: Distillate Oil (SCC 2102004000)					
PM10-FIL	1	LB	E3GAL	1	AP-42 Table 1.3-6
PM25-FIL	0.25	LB	E3GAL	0.25	AP-42 Table 1.3-6
PM-CON	1.3	LB	E3GAL	1.3	AP-42 Table 1.3-2
PM10-PRI		LB	E3GAL	2.30	
PM25-PRI		LB	E3GAL	1.55	
Industrial Boilers: Residual Oil (SCC 2102005000)					
PM10-FIL	7.17	LB	E3GAL	10.683	AP-42 Table 1.3-5. EF calculated from formula of 7.17(A); where A=1.12(S)+0.37; Assumed S=1% for purpose of calculating EF ratios.
PM25-FIL	4.67	LB	E3GAL	6.958	AP-42 Table 1.3-5. EF calculated from formula of 7.17(A); where A=1.12(S)+0.37; Assumed S=1% for purpose of calculating EF ratios.
PM-CON	1.5	LB	E3GAL	1.5	AP-42 Table 1.3-2
PM10-PRI		LB	E3GAL	12.18	
PM25-PRI		LB	E3GAL	8.46	
Industrial Boilers and IC Engines: Natural Gas (SCC 2102006000)					
PM10-FIL	1.9	LB	E6FT3	1.9	AP-42 Table 1.4-2
PM25-FIL	1.9	LB	E6FT3	1.9	AP-42 Table 1.4-2
PM-CON	5.7	LB	E6FT3	5.7	AP-42 Table 1.4-2
PM10-PRI	7.6	LB	E6FT3	7.60	
PM25-PRI	7.6	LB	E6FT3	7.60	

Table 11 (continued)

Pollutant[1]	Uncontrolled Emission Factor (EF)	EF Numerator	EF Denominator	Calculated Uncontrolled EF	Reference
Industrial Boilers - Liquified Petroleum Gas (SCC 2102007000)					
PM10-FIL	0.6	LB	E3GAL	0.6	AP-42 Table 1.5-1
PM25-FIL	0.6	LB	E3GAL	0.6	AP-42 Table 1.5-1
PM-CON	0.506	LB	E3GAL	0.506	Used natural gas PM-CON emission factor of 5.7 lb/Million Cubic Feet (for all PM controls and uncontrolled). Used factor of 0.0887 to convert emission factor from lb/Million Cubic Feet of natural gas to lb/1,000 gallons of propane. Reference: AP-42, Table 1.4-2. Conversion factor assumes 1020 Btu/scf for natural gas (AP-42, Table 1.4-2) and 90,500 Btu/gallon for propane (AP-42, Appendix A, page A-5).
PM10-PRI		LB	E3GAL	1.11	
PM25-PRI		LB	E3GAL	1.11	
Industrial Boilers: Kerosene (SCC 2102011000)					
PM10-FIL	1	LB	E3GAL	1	AP-42 Table 1.3-6
PM25-FIL	0.25	LB	E3GAL	0.25	AP-42 Table 1.3-6
PM-CON	1.3	LB	E3GAL	1.3	AP-42 Table 1.3-6
PM10-PRI		LB	E3GAL	2.30	
PM25-PRI		LB	E3GAL	1.55	
Commercial/Institutional Heating: Anthracite Coal (SCC 2103001000)					
PM10-FIL	2.3	LB	TON	30.77	AP-42 Table 1.2-4 EF calculated from formula of 2.3 * % Ash Content (13.38%). Reference for ash content is EPA, 2002.
PM25-FIL	0.6	LB	TON	8.03	AP-42 Table 1.2-4 EF calculated from formula of 0.6 * % Ash Content (13.38%). Reference for ash content is EPA, 2002.
PM-CON	0.08	LB	TON	1.07	AP-42 Table 1.2-3 Used formula for SCC 10300101, EF calculated from formula of 0.08 * % Ash Content (13.38%). Reference for ash content is EPA, 2002.
PM10-PRI		LB	TON	31.84	
PM25-PRI		LB	TON	9.10	
Commercial/Institutional Heating: Bituminous and Lignite (SCC 2103002000)					
PM10-FIL	13.2	LB	TON	13.2	AP-42 Table 1.1-9 EF
PM25-FIL	4.6	LB	TON	4.6	AP-42 Table 1.1-9 EF
PM-CON	1.04	LB	TON	1.04	AP-42 Table 1.1-5 (0.04 lb/MMBtu * 26MMBtu/ton=1.04)
PM10-PRI		LB	TON	14.24	
PM25-PRI		LB	TON	5.64	
Commercial/Institutional Heating: Distillate Oil (SCC 2103004000)					
PM10-FIL	1.08	LB	E3GAL	1.08	AP-42 Table 1.3-7
PM25-FIL	0.83	LB	E3GAL	0.83	AP-42 Table 1.3-7
PM-CON	1.3	LB	E3GAL	1.3	AP-42 Table 1.3-2
PM10-PRI		LB	E3GAL	2.38	
PM25-PRI		LB	E3GAL	2.13	

Table 11 (continued)

Pollutant[1]	Uncontrolled Emission Factor (EF)	EF Numerator	EF Denominator	Calculated Uncontrolled EF	Reference
Commercial/Institutional Heating: Residual Oil (SCC 2103005000)					
PM10-FIL	5.17	LB	E3GAL	7.703	AP-42 Table 1.3-7. EF calculated from formula of 5.17(A); where A=1.12(S)+0.37; Assumed S=1% for purpose of calculating EF ratios.
PM25-FIL	1.92	LB	E3GAL	2.861	AP-42 Table 1.3-7. EF calculated from formula of 5.17(A); where A=1.12(S)+0.37; Assumed S=1% for purpose of calculating EF ratios.
PM-CON	1.5	LB	E3GAL	1.5	AP-42, Table 1.3-2
PM10-PRI		LB	E3GAL	9.20	
PM25-PRI		LB	E3GAL	4.36	
Commercial/Institutional Heating: Natural Gas (SCC 2103006000)					
PM10-FIL	1.9	LB	E6FT3	1.9	AP-42 Table 1.4-2
PM25-FIL	1.9	LB	E6FT3	1.9	AP-42 Table 1.4-2
PM-CON	5.7	LB	E6FT3	5.7	AP-42 Table 1.4-2
PM10-PRI		LB	E6FT3	7.60	
PM25-PRI		LB	E6FT3	7.60	
Commercial/Institutional Heating: Liquified Petroleum Gas (SCC 2103007000)					
PM10-FIL	0.4	LB	E3GAL	0.4	AP-42 Table 1.5-1 (Propane for Commercial Boilers)
PM25-FIL	0.4	LB	E3GAL	0.4	AP-42 Table 1.5-1 (Propane for Commercial Boilers)
PM-CON	0.506	LB	E3GAL	0.506	Used natural gas PM-CON emission factor of 5.7 lb/Million Cubic Feet (for all PM controls and uncontrolled). Used factor of 0.0887 to convert emission factor from lb/Million Cubic Feet of natural gas to lb/1,000 gallons of propane. Reference: AP-42, Table 1.4-2. Conversion factor assumes 1020 Btu/scf for natural gas (AP-42, Table 1.4-2) and 90,500 Btu/gallon for propane (AP-42, Appendix A, page A-5).
PM10-PRI		LB	E3GAL	0.91	
PM25-PRI		LB	E3GAL	0.91	
Commercial/Institutional Heating: Kerosene (SCC 2103011000)					
PM10-FIL	1.08	LB	E3GAL	1.08	AP-42 Table 1.3-7 Used EF for Distillate Oil (per EIIP)
PM25-FIL	0.83	LB	E3GAL	0.83	AP-42 Table 1.3-7 Used EF for Distillate Oil (per EIIP)
PM-CON	1.3	LB	E3GAL	1.3	AP-42 Table 1.3-2 Used EF for Distillate Oil (per EIIP)
PM10-PRI		LB	E3GAL	2.38	
PM25-PRI		LB	E3GAL	2.13	
Residential Heating: Anthracite Coal (SCC 2104001000)					
PM10-FIL	10	LB	TON	10	EPA, 2002.
PM25-FIL	0.6	LB	TON	8.03	EF calculated from formula of 0.6 * % Ash Content (13.38%). Reference for EF and ash content is EPA, 2002.
PM-CON	0.08	LB	TON	1.07	EF calculated from formula of 0.08 * % Ash Content (13.38%). Reference for EF and ash content is EPA, 2002.
PM10-PRI		LB	TON	11.07	
PM25-PRI		LB	TON	9.10	

Table 11 (continued)

Pollutant[1]	Uncontrolled Emission Factor (EF)	EF Numerator	EF Denominator	Calculated Uncontrolled EF	Reference
Residential Heating: Bituminous and Lignite Coal (SCC 2104002000)					
PM10-FIL	6.2	LB	TON	6.2	AP-42 Table 1.1-11
PM25-FIL	3.8	LB	TON	3.8	AP-42 Table 1.1-11
PM-CON	1.04	LB	TON	1.04	AP-42 Table 1.1-5 (0.04 lb/MMBtu * 26 MMBtu/ton=1.04)
PM10-PRI		LB	TON	7.24	
PM25-PRI		LB	TON	4.84	
Residential Heating: Distillate Oil (SCC 2104004000)					
PM10-FIL	1.08	LB	E3GAL	1.08	AP-42 Table 1.3-7 (Commercial/Institutional EF)
PM25-FIL	0.83	LB	E3GAL	0.83	AP-42 Table 1.3-7 (Commercial/Institutional EF)
PM-CON	1.3	LB	E3GAL	1.3	AP-42 Table 1.3-2
PM10-PRI		LB	E3GAL	2.38	
PM25-PRI		LB	E3GAL	2.13	
Residential Heating: Natural Gas - All types (SCC 2104006000)					
PM10-FIL	1.9	LB	E6FT3	1.9	AP-42 Table 1.4.2
PM25-FIL	1.9	LB	E6FT3	1.9	AP-42 Table 1.4.2
PM-CON	5.7	LB	E6FT3	5.7	AP-42 Table 1.4.2
PM10-PRI		LB	E6FT3	7.60	
PM25-PRI		LB	E6FT3	7.60	
Residential Heating: Liquefied Petroleum Gas (SCC 2104007000)					
PM10-FIL	0.4	LB	E3GAL	0.4	AP-42 Table 1.5-1 (Same factor used for Propane for Commercial Boilers; based on EIIP)
PM25-FIL	0.4	LB	E3GAL	0.4	AP-42 Table 1.5-1 (Same factor used for Propane for Commercial Boilers; based on EIIP)
PM-CON	0.506	LB	E3GAL	0.506	Used natural gas PM-CON emission factor of 5.7 lb/Million Cubic Feet (for all PM controls and uncontrolled). Used factor of 0.0887 to convert emission factor from lb/Million Cubic Feet of natural gas to lb/1,000 gallons of propane. Reference: AP-42, Table 1.4-2. Conversion factor assumes 1020 Btu/scf for natural gas (AP-42, Table 1.4-2) and 90,500 Btu/gallon for propane (AP-42, Appendix A, page A-5).
PM10-PRI		LB	E3GAL	0.91	
PM25-PRI		LB	E3GAL	0.91	
Residential Heating: Kerosene (SCC 2104011000)					
PM10-FIL	1.08	LB	E3GAL	1.08	AP-42 Table 1.3-7 Used EF for Distillate Oil (per EIIP)
PM25-FIL	0.83	LB	E3GAL	0.83	AP-42 Table 1.3-7 Used EF for Distillate Oil (per EIIP)
PM-CON	1.3	LB	E3GAL	1.3	AP-42 Table 1.3-2 Used EF for Distillate Oil (per EIIP)
PM10-PRI		LB	E3GAL	2.38	
PM25-PRI		LB	E3GAL	2.13	

[1] PM10-PRI EF = sum of PM10-FIL and PM-CON EFs; PM25-PRI EF = sum of PM25-FIL and PM-CON EFs.

MO used the NEI data for industrial residual oil combustion, commercial/institutional residual oil combustion, and residential anthracite coal combustion. MO's inventory contained several PM QA issues, and MO provided corrections (using AP-42 emission factors) that were incorporated into the CENRAP inventory. MO did not provide any PM_{10} or $PM_{2.5}$ emissions data for forest wildfires (SCC 2810001000).

MN provided corrections to PM QA issues that were incorporated into the CENRAP inventory. Lancaster County, NE provided its own inventory for residential natural gas fired furnaces, and requested that no other industrial, commercial/institutional, or residential fossil fuel combustion categories in the NEI be added to its inventory. The tribal inventory did not contain any fossil fuel combustion inventory data.

TX's inventory was revised to address the PMx QA issues listed in the QA Summary Report (TX_NP_QA_Report_090904_v3.xls). Most of the QA issues in TX's inventory were associated with the sum of the filterable and condensible emissions not equaling the primary emissions. This issue was corrected by replacing the primary emissions with the sum of the filterable and condensible emissions. Many of the QA issues were associated with daily emissions. Since daily emissions are not needed to support regional haze air quality modeling, TX and CENRAP agreed to remove the daily PMx emissions from TX's inventory.

Residential Wood Combustion

The states of IA, LA, NE, and OK (including Lancaster County) used the residential wood combustion inventory in the preliminary 2002 NEI for the CENRAP inventory. Revisions to the NEI for residential wood combustion were completed after the preliminary 2002 NEI was released in February 2004; the revised inventories for this category was were included in the CENRAP inventory for IA, LA, NE, and OK.

The states of AR, KS, MN, MO, and TX prepared their own residential wood combustion inventories. KS and MO provided replacement inventories that disaggregated the emissions in more detail (i.e., by separate SCCs for fireplaces and woodstoves) than provided in their original inventory submittal to EPA. In addition, KS, MO, and MN revised the emission factors and provided updated emissions for CO and PM10-PRI and PM25-PRI that originate from the NEI method for this category to address a unit conversion issue identified with the NEI emission factors.

Other Sources of PM Emissions

For states that provided only PM10-FIL and PM25-FIL emissions, PM10-PRI emissions were set equal to PM10-FIL emissions and PM25-PRI emissions were set equal to PM25-FIL emissions. The PM10-PRI and PM25-PRI emissions that were added to the inventory were assigned a data source code of S-02-X-PR where S-02-X code represents the code assigned to the PM10-FIL and PM25-FIL emissions provided by the S/L/T agency and the "-PR" indicates that the ratio was applied to estimate the primary emissions (in this case, the ratio of primary to filterable emissions is "1").

PM25-PRI emissions missing from S/L/T inventories were estimated by applying a ratio of PM25-PRI to PM10-PRI emissions to the PM10-PRI emissions provided by the S/L/T agency. Table 12 identifies the agencies with SCCs for which ratios were applied to estimate PM25-PRI emissions. This table also shows the ratios and the reference for the ratios.

TX's inventory for agricultural tilling (SCC 2801000000) contained records where the filterable emissions exceeded the primary emissions. These emissions were grown from Version 3 of the 1999 NEI. This issue was corrected by setting the PM10-PRI and PM25-PRI emissions equal to the PM10-FIL and PM25-FIL emissions.

Table 12. SCCs for which PM25-PRI Emissions were Estimated by Applying a Ratio to the PM10-PRI Emissions in the S/L/T inventory

SCC	SCC Description	Agency	Ratio of PM25-PRI to PM10-PRI	Reference
2294000000	Mobile Sources : Paved Roads : All Paved Roads : Total: Fugitives	Fond du Lac Band of the Minnesota Chippewa Tribe	0.25	NEI Method
2296000000	Mobile Sources : Unpaved Roads : All Unpaved Roads : Total: Fugitives	Fond du Lac Band of the Minnesota Chippewa Tribe	0.15	NEI Method
2505020000	Storage and Transport : Petroleum and Petroleum Product Transport : Marine Vessel : Total: All Products	MO	1	No data available; assumed PM25-PRI equals PM10-PRI
2535010000	Storage and Transport : Bulk Materials Transport : Rail Car : Total: All Products	Lancaster County, NE	1	No data available; assumed PM25-PRI equals PM10-PRI
2810015000	Miscellaneous Area Sources : Other Combustion : Prescribed Burning for Forest Management : Total	Fond du Lac Band of the Minnesota Chippewa Tribe	1	No data available; assumed PM25-PRI equals PM10-PRI
2810020000	Miscellaneous Area Sources : Other Combustion : Prescribed Burning of Rangeland : Total	KS, LA, and NE	0.8	Based on average ratio of PM25-PRI to PM10-PRI for emissions data provided by other CENRAP states
2810030000	Miscellaneous Area Sources : Other Combustion : Structure Fires : Total	MO	0.91	NEI Method
2810050000	Miscellaneous Area Sources : Other Combustion : Motor Vehicle Fires : Total	MO, TX	0.91	NEI Method

c. 2002 NEI

Merging of NEI Data into S/L Inventories

The area source inventory provided by each S/L agency was compared to the 2002 NEI to identify categories in the NEI that were not in each S/L inventory. The list of categories identified was provided to each S/L agency and each agency then selected the NEI categories to be added to their inventory. Identification of categories included in the 2002 NEI but not in a S/L inventory involved a two-step process. First, Pechan identified the categories in the NEI that did not have an electronic match on the data key of the EM table between the S/L inventory and the NEI. Then, Pechan manually compared the NEI categories without an electronic match to

the S/L inventory to identify and eliminate NEI categories that were in the S/L inventory but had a different SCC. For example, a state inventory may use a general SCC for a category while the NEI may use different SCCs to breakout emissions at a finer detail. Examples of categories where this typically occurred include residential wood combustion, open burning of land clearing debris, solvent utilization, and petroleum marketing and transportation categories. In addition, if a S/L agency requested that a CENRAP-sponsored inventory be added to its inventory, the NEI categories that overlapped with the CENRAP-sponsored categories were removed from the list of NEI categories considered for incorporation into a S/L inventory.

Note that the preliminary 2002 NEI did not contain any data for the Fond du Lac Band of the Minnesota Chippewa Tribe. Therefore, a comparison of the tribal inventory to the NEI was not made.

The source categories in the 2002 NEI that were added to a S/L/T inventory can be identified where the data source code starts with "E". These categories can be identified using the data source code field in the NIF 3.0 files or in the summary of area source emissions that contains the data source code.

Revisions to the Preliminary 2002 NEI

During preparation of the CENRAP inventory, EPA completed revisions to the emissions for six categories in the preliminary 2002 NEI released in February 2004. As agreed to with each S/L agency, the revised emissions were used in the CENRAP inventory in lieu of the preliminary 2002 NEI emissions if the agency requested that the category be included.

1. Non-Residential Construction (SCC 2311020000): 2002 emissions data replaced data in preliminary 2002 NEI that were carried forward from 1999 NEI.

2. Highway Construction (SCC 2311030000): 2002 emissions data replaced data in preliminary 2002 NEI that were carried forward from 1999 NEI.

3. Open Burning of Land Clearing Debris (SCC 2610000500): 2002 emissions data replaced data in preliminary 2002 NEI that were carried forward from 1999 NEI. The activity for this category was based on activity prepared for the non-residential and highway construction categories. For 2002, emissions were set to zero for counties with a population that was 80% urban or more based on 2000 Census data. This was not done for the 1999 NEI. For the NEI method, it was assumed that highly urban counties do not allow this activity to take place. Note that 2002 emissions data were already included in the preliminary 2002 NEI for the open burning of residential municipal solid waste, open burning of yard waste, and the residential construction categories.

4. Residential LPG Combustion (SCC 2104007000): 2000 emissions data replaced data in the preliminary 2002 NEI that were carried forward from 1999 NEI.

5. Residential Kerosene Combustion (SCC 2104011000): 2000 emissions data replaced data in the preliminary 2002 NEI that were carried forward from 1999 NEI.

6. Residential Wood Combustion (SCCs starting with 2104008xxx; 4 SCCs for fireplaces and 3 SCCs for woodstoves): The preliminary 2002 NEI emissions were revised to:
   (a) correct the CO, PM10-PRI, and PM25-PRI emission factors for fireplaces without inserts (this change doubled the emission factors associated with correcting an error in converting the values from g/kg to lb/ton);
   (b) correct the climate zone map for allocating national activity to states;
   (c) replace 1997 total residential wood consumption with 2001 estimates (this change reduced wood consumption for fireplaces with inserts and woodstoves);
   (d) update urban/rural population data to reflect 2002 estimates based on year 2002 total county population and year 2000 county ratios of urban/rural population to total population; and
   (e) change the data source code from E-02-X (this was incorrect) to E-01-X to reflect 2001 activity data adjusted to 2002.

5. Revisions to Address Comments

The following items were revised per state instruction during S/L/T agency review of the draft area source inventory:

a. Missouri

Missouri provided revisions to annual VOC emissions for the following surface coating categories to correct for double-counting of emissions in the draft inventory.

SCC	SCC Description
2401015000	Solvent Utilization : Surface Coating : Factory Finished Wood: SIC 2426 thru 242 : Total: All Solvent Types
2401020000	Solvent Utilization : Surface Coating : Wood Furniture: SIC 25 : Total: All Solvent Types
2401040000	Solvent Utilization : Surface Coating : Metal Cans: SIC 341 : Total: All Solvent Types
2401050000	Solvent Utilization : Surface Coating : Miscellaneous Finished Metals: SIC 34 - (341 + 3498) : Total: All Solvent Types
2401055000	Solvent Utilization : Surface Coating : Machinery and Equipment: SIC 35 : Total: All Solvent Types
2401060000	Solvent Utilization : Surface Coating : Large Appliances: SIC 363 : Total: All Solvent Types
2401065000	Solvent Utilization : Surface Coating : Electronic and Other Electrical: SIC 36 - 363 : Total: All Solvent Types
2401070000	Solvent Utilization : Surface Coating : Motor Vehicles: SIC 371 : Total: All Solvent Types

2401080000   Solvent Utilization : Surface Coating : Marine: SIC 373 : Total: All Solvent
Types

For these SCCs, MO did not provide any daily emissions. The daily emissions in the draft
inventory originated from the 1999 NEI. The daily emissions for some of the SCCs were greater
than the annual emissions after incorporating the revised inventory supplied by MO. After
discussing this issue with Missouri, the following revisions were made to the daily emissions:

(1)   For records where Missouri's revised annual emissions were zero, the daily
emissions were set to zero and the data source code was set to S-02-X; and

(2)   For records where Missouri's revised annual emissions were greater than zero,
the daily emissions were removed from the CENRAP inventory.

b.   *Minnesota*

Minnesota provided a new inventory of annual VOC emissions for asphalt paving (SCC
2461021000) that was added to the final inventory. Minnesota provided revisions to annual CO,
NH_3, NOX, PM10-PRI, PM25-PRI, SO_2, and VOC for the following commercial/institutional
fossil fuel and wood combustion categories:

SCC	SCC Description
2103002000	Stationary Source Fuel Combustion : Commercial/Institutional : Bituminous/Subbituminous Coal : Total: All Boiler Types
2103004000	Stationary Source Fuel Combustion : Commercial/Institutional : Distillate Oil : Total: Boilers and IC Engines
2103005000	Stationary Source Fuel Combustion : Commercial/Institutional : Residual Oil : Total: All Boiler Types
2103006000	Stationary Source Fuel Combustion : Commercial/Institutional : Natural Gas : Total: Boilers and IC Engines
2103007000	Stationary Source Fuel Combustion : Commercial/Institutional : Liquified Petroleum Gas (LPG) : Total: All Combustor Types
2103008000	Stationary Source Fuel Combustion : Commercial/Institutional : Wood : Total: All Boiler Types
2103011000	Stationary Source Fuel Combustion : Commercial/Institutional : Kerosene : Total: All Combustor Types

c.   *Oklahoma*

Daily VOC emissions for oil and gas exploration were removed. Oklahoma's area source
inventory was taken from the preliminary 2002 NEI except that Oklahoma provided an inventory
of annual VOC, NOX, and CO emissions for natural gas exploration that replaced the annual
emissions from the preliminary NEI (that originated from Version 3 of the 1999 NEI).
Oklahoma did not provide revisions to the old daily emissions. Given that the old daily
emissions were not calculated from the new annual emissions supplied by Oklahoma, the daily
emissions were removed from the CENRAP inventory.

Replaced emissions with more recent emissions estimates from the 2002 NEI for the following categories:

SCC	SCC Description
Residential Stationary Source Fuel Combustion	
2104002000	Bituminous/Subbituminous Coal / Total: All Combustor Types
2104004000	Distillate Oil / Total: All Combustor Types
2104006000	Natural Gas / Total: All Combustor Types
2104007000	Liquified Petroleum Gas (LPG) / Total: All Combustor Types
2104008001	Wood / Fireplaces: General
2104008002	Fireplaces: Insert; non-EPA certified
2104008003	Fireplaces: Insert; EPA certified; non-catalytic
2104008004	Fireplaces: Insert; EPA certified; catalytic
2104008010	Woodstoves: General
2104008030	Catalytic Woodstoves: General
2104008050	Non-catalytic Woodstoves: EPA certified
2104011000	Kerosene Combustion
Fugitive Dust from Roads	
2294000000	All Paved Roads / Total: Fugitives
2296000000	All Unpaved Roads / Total: Fugitives
Fugitive Dust from Construction	
2311010000	Residential / Total
2311020000	Industrial/Commercial/Institutional / Total
2311030000	Highway Construction
Storage and Transport / Petroleum and Petroleum Product Storage	
2501000000	All Storage Types: Breathing Loss / Total: All Products
2501080050	Airports : Aviation Gasoline / Stage 1: Total
2501080100	Airports : Aviation Gasoline / Stage 2: Total
Open Burning	
2610000100	Yard Waste - Leaf Species Unspecified
2610000400	Yard Waste - Brush Species Unspecified
2610000500	Land Clearing Debris
2610030000	Residential / Household Waste
Miscellaneous Area Sources / Agriculture Production - Crops	
2801000000	Cotton Ginning

e.   Agricultural Tilling

The CENRAP-sponsored inventory for fugitive dust emissions from agricultural tilling (SCC 2801000003 - Miscellaneous Area Sources : Agriculture Production - Crops : Agriculture - Crops : Tilling) was updated on October 27, 2004. However, the timing of the revision was too late to incorporate into the December 8, 2004 draft CENRAP inventory. Therefore, the agricultural tilling emissions were updated to match those in the revised CENRAP-sponsored inventory for the states that elected to use the CENRAP-sponsored inventory.

f.   Open Burning Categories

For the following open burning emissions categories that originate from the 2002 NEI (Data Source Code = E-02-X), removed CE records where the primary device type for miscellaneous controls (code 099) were associated with uncontrolled emissions in the emission table.

SCC	SCC Description
2610000100	Yard Waste - Leaf Species Unspecified
2610000400	Yard Waste - Brush Species Unspecified
2610000500	Land Clearing Debris
2610030000	Residential / Household Waste

6.   QA Review of Final Inventory

Final QA checks were run on the revised data set to ensure that all corrections provided by the S/L/T agencies were incorporated into the S/L/T inventories and that there were no remaining QA issues that could be addressed during the duration of the project. After exporting the inventory in Oracle to an Access database in NIF 3.0, the EPA's QA program was run on the Access database and the QA output was reviewed to verify that all QA issues that could be addressed were resolved (EPA, 2004a).

One remaining issue that was not addressed concerns double counting of NH_3 emissions in the onroad inventory. The area miscellaneous source inventory for Iowa, Kansas, and Louisiana include NH_3 emissions for the following two SCCs that originate from the CENRAP-sponsored NH_3 inventory:

SCC	SCC Description
2201001000	Mobile Sources / Highway Vehicles - Gasoline / Light Duty Gasoline Vehicles (LDGV) / Total: All Road Types)
2230001000	Mobile Sources / Highway Vehicles - Diesel / Light Duty Diesel Vehicles (LDDV) / Total: All Road Types)

The onroad inventory includes NH_3 emissions for these source categories as well. Thus, if the area source inventory is revised in the future, these two SCCs should be removed from the area source inventory. For all three states and the two SCCs combined, the NH_3 emissions total to 8,735 annual tons. In each of the three states, the light-duty gasoline vehicles category accounts for 24 to 31 percent of the total area miscellaneous inventory for the state, but only 1 to 4 percent

when compared to total NH_3 emissions in the area and area miscellaneous inventories combined. At the CENRAP-region level, the percentages are less than 1 percent of total NH_3 emissions from all sources.

The output file from the EPA's QA program run on the area source inventory and the area miscellaneous source inventory is provided in an Access 2000 database along with the Access database containing the area and area miscellaneous inventory in NIF 3.0. The following lists the remaining QA issues that were not addressed during the duration of this project:

Area Source Inventory

> Range Errors: There are 1,418 records in the EM table with emissions that exceed the maximum emissions in the QA program for the specified pollutant.

> Lookup Errors: There are 333 records in the PE table and 6,548 records in the EM table with lookup errors. The look-up errors in both the PE and EM tables are associated with units that are not in the NIF 3.0 reference table, but EPA has indicated that the units will be added to the NIF 3.0 reference table.

Area Miscellaneous Source Inventory

> Lookup Errors: There are 216,372 records in the PE table and 199,728 records in the EM table with lookup errors. The look-up errors in both the PE and EM tables are associated with units that are not in the NIF 3.0 reference table, but EPA has indicated that the units will be added to the NIF 3.0 reference table.

D.   Nonroad Source Inventory Methods

Initially, work on the nonroad inventory was to be limited to the non-NONROAD Model categories for commercial and military aircraft, commercial marine vessel, and railroad locomotives. The CENRAP-sponsored inventory for the NONROAD Model categories was to be used to support air quality modeling and planning. However, during the project TX updated its inventory for the NONROAD Model categories and requested that this inventory be used instead of the CENRAP-sponsored inventory for the NONROAD Model categories. Since Pechan obtained the CENRAP-sponsored inventory for the NONROAD Model categories to support the preparation of emissions summaries, the CENRAP-sponsored inventory for the NONROAD Model categories in TX was replaced with TX's NONROAD Model inventory. Then, the inventories for aircraft, commercial marine vessel, and railroad locomotives were added to the NONROAD Model inventory for all S/L agencies to create a consolidated nonroad inventory for CENRAP.

The following discusses the QA that was completed on the inventories for aircraft, commercial marine vessel, and railroad locomotives and explains the data sources used to compile the inventories for these non-NONRAOD Model categories. QA review of the NONROAD Model inventory was completed under a separate CENRAP-sponsored project.

1. Data Sources

For each S/L/T inventory submitted to EPA, Table 13 provides a summary of the pollutants included in each inventory, and the number of counties for which data were provided for the aircraft, commercial marine vessel, and railroad locomotive categories. The table also shows the number of counties in the 2002 preliminary NEI for the aircraft, commercial marine vessel, and railroad locomotive categories and the number of counties in each state.

AR and TX provided emissions data for all three of the non-NONROAD Model categories. For the railroad locomotive category, KS, LA, MN, and MO included NH_3 emissions based on Carnegie Mellon University (CMU) model estimates in their inventories. MN also included CAP emissions in the inventory it submitted to EPA.

- The nonroad source inventories obtained from EPA were loaded into Oracle in NIF 3.0 into one data set. Then, the following updates were performed on the consolidated data set, if necessary:

- HAP records were removed since the inventory will support regional haze, fine PM, and ozone modeling.

- Pollutant codes were corrected to make them NIF 3.0 compliant (e.g., update PMPRI pollutant code to PM-PRI). Additionally, other codes were identified for remediation on a case-by-case basis.

- Records with a submittal flag indicating deletions (submittal_flag = 'D' or 'RD') were removed from the inventory.

- Null values in the tribal code field were updated to '000' since this field is a part of the data key that defines records as unique in all eight NIF tables.
- Added and populated the NIF plus fields listed in the previous discussion for the area source inventory.

- The CENRAP-sponsored inventory did not contain S/L agency contact information in the TR table. In addition, the TR table for the data taken from the preliminary 2002 NEI contained the contact information for EPA. Therefore, the TR table was updated to include the contact information that S/L agencies provided in their area source inventories.

Table 13. Summary of Pollutants and Number of Counties Included in Nonroad Source Inventories

State/Local/Tribal Agency	Sector	CO	NH₃	NOₓ	PM10-PRI	PM25-PRI	PM10-FIL	PM25-FIL	PM-CON	SO₂	VOC	Number of Counties in 2002 S/L/T Inventory	Number of Counties in 2002 Preliminary NEI	Number of Counties in State
AR	Commercial Marine Vessels (CMV)	x	x	x	x	x				x	x	27	25	75
	Railroad Locomotives	x	x	x	x	x				x	x	75	75	75
	Aircraft	x	x	x	x	x				x	x	68	41	75
KS	Railroad Locomotives		x									2	105	105
LA	Railroad Locomotives		x									3	64	64
MN	Railroad Locomotives	x	x	x	x					x	x	81	87	97
MO	Railroad Locomotives		x									2	115	115
TX	CMV	x		x	x	x	x	x		x	x	19	19	254
	Railroad Locomotives	x	x	x	x	x				x	x	254	254	254
	Aircraft	x		x	x	x	x			x	x	167	124	254

2. QA Review

QA review was conducted on the inventories in accordance with the QA procedures specified in the QAPP for this project (CENRAP, 2004b). The following discusses the QA checks that were completed during preparation of the consolidated data set.

a. County and SCC Coverage

For the agencies that submitted inventories to EPA, the county coverage in the inventories appeared to be reasonable. However, the NH_3 inventories for KS, LA, MN, and MO covered significantly fewer counties than what the preliminary 2002 NEI covered. The differences in the county coverage for NH_3 emissions were due to differences in the methods used to prepare the state NH_3 inventory and the NEI.

b. Pollutant Coverage

The pollutant coverage in the S/L/T inventories was complete for all pollutants except that MN did not include PM25-PRI emissions for railroad locomotives in its inventory, and TX did not provide NH_3 emissions for commercial marine vessels and aircraft in its inventory. MN provided PM25-PRI emissions to fill this data gap. TX did not provide any NH_3 emissions for commercial marine vessels or aircraft.

c. Additional QA for the CENRAP Area Source Inventory

The QA procedures discussed previously for the S/L/T area source inventories were applied to the S/L inventories for aircraft, commercial marine vessels, and railroad locomotives.

3. Responses from S/L/T Agencies

The nonroad source inventories were revised to incorporate updates from MN and to incorporate TX's NONROAD Model inventory. No other QA issues were identified in the state inventories for the non-NONROAD Model categories.

4. Gap Filling and Augmentation

Table 14 provides a summary of the sources of data used to prepare the consolidated inventory for aircraft, commercial marine vessels, and railroad locomotives. For commercial marine vessels and railroad locomotives, the CENRAP-sponsored inventory was used for all states except for AR, MN, and TX who provided their own inventories. Note that the CMU Model NH_3 emissions that KS, LA, and MO included in their inventory submittals to EPA for railroads were replaced with NH_3 emissions in the CENRAP-sponsored inventory.

Table 14. Summary of Data Sources Used to Prepare the Consolidated Nonroad Inventory for Aircraft, Commercial Marine Vessels, and Railroad Locomotives

State/Local Agency	Source of Inventory Data	Notes
Commercial and Military Aircraft (SCC 227500xxxx - 227507xxxx)		
AR	State	
IA	2002 NEI	
KS	State	State inventory is based on the 2002 NEI
LA	2002 NEI	
MN	State	Included in point source inventory
MO	2002 NEI	
NE - Lancaster County	2002 NEI	
NE - State	2002 NEI	
OK	2002 NEI	
TX	State	
Commercial Marine Vessels (SCC 228000xxxx)		
AR	State	
IA	CENRAP Inventory	
KS	CENRAP Inventory	
LA	CENRAP Inventory	
MN	State	
MO	CENRAP Inventory	
NE - Lancaster County	CENRAP Inventory	
NE - State	CENRAP Inventory	
OK	CENRAP Inventory	
TX	State	
Railroad Locomotives (SCC 2285002006 - 2285002010)		
AR	State	
IA	CENRAP Inventory	
KS	CENRAP Inventory	
LA	CENRAP Inventory	
MN	State	
MO	CENRAP Inventory	
NE - Lancaster County	CENRAP Inventory	
NE - State	CENRAP Inventory	
OK	CENRAP Inventory	
TX	State	

AR, KS, MN, and TX included aircraft emissions in the inventories they submitted to EPA. However, MN included aircraft emissions in its point source inventory that were included in the point source inventory for CENRAP. KS' inventory was based on the aircraft inventory included in the preliminary 2002 NEI. CENRAP did not sponsor development of an inventory for commercial and military aircraft. Therefore, the 2002 NEI was used as the source of aircraft inventory data for the states that did not provide an inventory for this source category. QA review of PM emissions did not find any missing data after updating MN's inventory for railroad locomotives. Therefore, no PM augmentation was performed on the nonroad inventories.

5. Revisions to Address Comments

The nonroad inventory was revised for Minnesota to remove double-counting of emissions for SCC 2265008005 (Mobile Sources / Off-highway Vehicle Gasoline, 4-Stroke / Airport Ground Support Equipment / Airport Ground Support Equipment). Minnesota included emissions for this SCC in its point source inventory. The nonroad inventory contained only annual emissions for this SCC, which came from the CENRAP-sponsored nonroad inventory. The annual emissions removed from the nonroad inventory are as follows:

Pollutant	Annual Emissions (tons/year)	Counties Affected (State and County FIPS code)
VOC	8.65	27007, 27037, 27041, 27053, 27091, 27109, 27123, 27137, 27145, 27163
NOX	7.6	27007, 27037, 27041, 27053, 27091, 27109, 27123, 27137, 27145, 27163
CO	212.7	27007, 27037, 27041, 27053, 27091, 27109, 27123, 27137, 27145, 27163
SO_2	0.04	27053
PM10-PRI	0.07	27053
PM25-PRI	0.06	27053
NH_3	0.01	27053

6. QA Review of Final Inventory

Final QA checks were run on the revised data set to ensure that all corrections provided by the S/L/T agencies were incorporated into the S/L/T inventories and that there were no remaining QA issues that could be addressed during the duration of the project. After exporting the inventory in Oracle to an Access database in NIF 3.0, the EPA's QA program was run on the Access database and the QA output was reviewed to verify that all QA issues that could be addressed were resolved. The QA output is provided in an Access 2000 database along with the Access database containing the inventory in NIF 3.0.

The following lists the remaining QA issues that were not addressed during the duration of this project:

Range Errors: There are 260 records in the EM table with emissions that exceed the maximum emissions in the QA program for the specified pollutant.

Lookup Errors: There are 105,667 records in the EM table with CO_2 emissions that caused this error. CO_2 is not included in the reference table for valid NIF 3.0 pollutant codes. At the request of CENRAP, CO_2 emissions were kept in the inventory.

E.   2002 CEM Data Methods and Results

1.   Introduction

The 2002 CEM data for the entire CENRAP modeling domain were collected and converted to SMOKE and the RPO data exchange protocol formats. A crosswalk file was developed in order to process CEM data for all four quarters of 2002 into the formats required by CENRAP.

CEM data were also compiled for the CENRAP Region for the years 2000, 2001, and 2003. The data for these years were combined with the 2002 CEM data to develop three (3) sets of temporal profiles. The sets of profiles generated include seasonal profiles, daily profiles by season, and hourly profiles by season. National Weather Service temperature data that were readily available were analyzed. Recommendations were made on whether or not to generate temporal profiles based on these parameters. Additional recommendations were made on the best approaches for assigning temporal profiles to individual units.

2.   Data Sources

The data source for the CEM data for the years 2000 through 2003 is the EPA's website, specifically the following websites were used for acquiring raw data and reports to QA the CEM data:

- http://www.epa.gov/airmarkets/emissions/raw/index.html (Clean Air Markets data)
- http://cfpub.epa.gov/gdm/index.cfm?fuseaction=prepackaged.select (Emissions data and reports)
- http://www.epa.gov/airmarkets/emissions/prelimarp/ (more emissions reports)

The CEM units in the raw data sets were mapped to the appropriate source(s) in the consolidated 2002 point source inventory. We worked together with Pechan and the CENRAP states by soliciting feedback on the CEM units that we were not able to initially match up with the 2002 inventory. The mapping entailed matching a CEM unit (Office of Regulatory Information Systems [ORIS] ID and unit ID) to the state and county FIPS, Plant, Stack, and Segment identifier. The data were formatted into hour-specific emissions that are readable by the SMOKE modeling system and also in the RPO data exchange format.

CEM data for year 2002 for areas outside of the CENRAP were obtained from RPOs and EPA when the data were available. CEM data for the Visibility Improvement State and Tribal Association of the Southeast (VISTAS) states were obtained from the VISTAS RPO via the Alpine Geophysics ftp site (ftp agftp.com). The data consisted of hour-specific CEM data for the year 2002. The other RPOs (Midwest, Western Regional Air Partnership [WRAP] and Mid-Atlantic/Northeast Visibility Union [MANE-VU]) did not have CEM data readily available and/or correct and updated crosswalks for the CEM units for a current year 2002 inventory for their particular region. Only VISTAS met these requirements. The Midwest and MANE-VU RPOs are still generating their updated year 2002 point source inventories (September-November 2004), therefore updated crosswalks had not been generated. Several RPOs (e.g., Midwest) indicated that they may rely on EPA to create the CEM crosswalk data for their

particular region. We acquired the raw CEM data for the year 2002 for the entire United States region from EPA (Marc Houyoux). If and when the crosswalks become available for the other RPOs regions, CENRAP can then use these crosswalk data along with the raw data for the United States to implement hour-specific CEM data throughout their entire modeling domain.

Software was generated to process the CEM data for years 2000 through 2003 and generate monthly, weekly, and hourly profiles for each of the four seasons in SMOKE-ready format. National Weather Service temperature data were obtained from the University of California, Riverside (UCAR) website at http://dss.ucar.edu/datasets/ds472.0. Meteorological data from years 2000-2002 were obtained from UCAR. Plants subject to EPA CEM requirements are not required to report hourly stack flow rates to EPA. We were unable to find a reliable, consistent source of stack flow data that could be used in generating recommendation for temporal profiles for the year 2002.

Table 15 provides a summary of the CEM crosswalk files and documentation acquired for this project.

Table 15. CEM Crosswalk Files and Documentation

Data	Source	Date acquired or generated	Time Period of Data	Known deficiencies
Year 2000-2003 CEM data for CENRAP states	EPA website	27-Aug-04	Year 2000 thru 2003	None known at time of analysis
Year 2000-2003 CEM reports for CENRAP states	EPA website	15-Sep-04	Year 2000 thru 2004	None known at time of analysis
2002 point source inventory data in draft format	Pechan	19-Aug-04	Year 2002	Updates were received up through the month of Sept 2004.
CEM crosswalk for CENRAP states (final version)	UNC-CEP	27-Oct-04	Year 2002	Missing crosswalk data for some CEM units. Used 2002 point source inventory data for mapping information instead of final SMOKE IDA or inventory file used in emissions modeling
VISTAS RPO CEM data	Alpine Geophysics	24-Aug-04	Year 2002	None known at time of analysis
Year 2002 CEM data for all United States	EPA (Marc Houyoux)	03-Sep-04	Year 2002	None known at time of analysis
NWS 2000-2002 temperature data	UCAR	17-Sep-02	Year 2000 thru 2002	None known at time of analysis

3. QA Review

Carolina Environmental Program (CEP) analyzed the CEM crosswalk generated to match up CEM units with a source in the 2002 point source inventory along with the raw CEM databases to determine which units/sources were not being used due to the lack of crosswalk data and/or

bad or no CEM data. There were data for a total of 775 CEM units in the CENRAP states. We informed CENRAP of all CEM units where we lacked sufficient crosswalk data that emitted over 40 tons per year of NO_x or SO_2. It was also recommended to CENRAP that those units that, (1) emitted less than 40 tons per year, and (2) for which no crosswalk record was available, be omitted. A total of 293 units emitted less than less than 40 tons of NO_x in year 2002. A total of 570 units emitted less than 40 tons of SO_2 in year 2002. Some crosswalk data for these "minor-emitting" units were easily obtainable from the 2002 point source inventory. Initial QA review revealed that CEP would most likely be able to map about 500 CEM units (64% of the total number of the units or about 90% of the total emissions) to the inventory data.

We also compared the CEM data in these raw datasets and versus the reports available at (http://cfpub.epa.gov/gdm/index.cfm?fuseaction=prepackaged.select and http://www.epa.gov/airmarkets/emissions/prelimarp/) to ensure that the data we were going to use to create hour-specific emissions were consistent with these reporting tools.

Software was developed to process the CEM data for years 2000 through 2003 to generate monthly, weekly, and hourly profiles for each of the four seasons in SMOKE-ready format. CEP used the same CEM crosswalk created for the 2002 inventory for these years. If the 2002 CEM crosswalk was not able to match up a major-emitting unit from any of the other three years, this unit would have been flagged and been brought to CENRAP's attention. None of these instances were found. It should be noted that this was a temporal profile analysis task and not a task where SMOKE-ready hour-specific emissions data needed to be created. We spot-checked some of the profiles generated from these raw datasets versus the reports available at EPA websites to ensure that the data reformat process had not introduced any errors.

4. Supplemental Data/Augmentation Procedures

UNC-CEP examined the crosswalks generated at CEP and the raw CEM databases acquired from EPA and determined no changes/augmentations to the raw CEM databases were necessary. We did however inform CENRAP via email on October 12, 2004 of the CEM units we were unable to match to the CENRAP 2002 inventory. We did receive feedback from IA, TX, and MN and were able to create crosswalk records to enable more CEM data to be used for these particular states. If we did not enough information to map a CEM unit to a particular source and we did not receive feedback from CENRAP states, then the emissions data for these CEM units were not used to generate hour-specific emissions data for SMOKE. To help keep track of the changes to the CEM crosswalks and other ancillary data used for the processing of the CEM data, these data were checked into Concurrent Versions System (CVS).

The year 2000, 2001 and 2003 CEM data were also examined and spot-check comparisons were carried out using the CEM unit reports also available on the EPA website. It was determined that the CEM data did not need any changes/augmentations in order to perform the temporal profile analysis.

5. QA Review of Final Data Set

CEP analyzed the CEM crosswalk generated after receiving feedback from the CENRAP states to ensure that only changes made were due to new information received. We also determined again which units/sources were not being used due to the lack of crosswalk data and/or bad or no CEM data. Table 16 lists the CEM units that emitted over 40 tons per year of NO_x or SO_2 that could not be identified in the 2002 point source inventory.

Table 16. CEM Units for which Matches to Emission Units could not be Identified in State Inventories

ORISPL ID	Plant Name	STATE	REGION	UNITID	2002 SO$_2$	2002 NOx
000202	Carl Bailey	AR	6	01	380.3	147.8
000170	Lake Catherine	AR	6	1	0.1	43.5
000170	Lake Catherine	AR	6	2	0.1	53.1
000170	Lake Catherine	AR	6	3	0.2	52.4
000170	Lake Catherine	AR	6	4	3.8	1421.0
055075	Pine Bluff Energy Ce	AR	6	CT-1	11.1	228.0
001175	Pella	IA	7	CS67	413.7	281.7
055117	R S Cogen	LA	6	RS-5	0.7	53.5
055117	R S Cogen	LA	6	RS-6	0.6	48.8
002241	C W Burdick	NE	7	B-3	0.2	76.3
002291	North Omaha	NE	7	CS000A	5,030.0	2661.3
002291	North Omaha	NE	7	4	2,604.8	1,530.4
002291	North Omaha	NE	7	5	3,874.4	1,916.3
055098	Frontera Power Facil	TX	6	1	1.6	87.8
055098	Frontera Power Facil	TX	6	2	1.4	76.2
	Total				**12,323.0**	**8,678.1**

The CEM data associated with the CEM units in the table above could not be used due to insufficient mapping information. This represents a very small portion of the total emissions emitted in year 2002 by the units in the CENRAP states. According to EPA CEM emissions reports, about 1.50 million tons of SO_2 and 0.90 million tons of NO_x were emitted by the CEM units in the CENRAP states. In summary, CEP was able to map 567 of the total 775 units (or 73%) to the inventory data. This translated to successfully mapping 1.49 millions tons of SO_2 emissions (or 99.3% of the total SO_2 emissions) and 0.89 million tons of NOx emissions (or 98.9% of the total NO_x emissions). However, it should be noted that the initial mapping was carried out using the draft point source inventory. During December 2004, the SMOKE IDA inventory files became available to CENRAP. The CENRAP Emissions Modeling contractors began using the SMOKE IDA point source inventory with the SMOKE-formatted hour-specific data created at UNC-CEP. A few CEM (hour-specific) sources were found to be incorrectly mapped during SMOKE processing and, therefore, the hour-specific data could not be used. UNC-CEP corrected the identification information in the hour-specific data so these sources will be correctly mapped to the SMOKE IDA point source inventory. UNC-CEP delivered a new version of the SMOKE hour-specific files to CENRAP on January 27, 2005.

We also carried out spot-checks of the CEM data in the raw datasets and the hourly-emissions files generated (SMOKE hour-specific and RPO formatted files) versus the reports available at (http://cfpub.epa.gov/gdm/index.cfm?fuseaction=prepackaged.select and http://www.epa.gov/airmarkets/emissions/prelimarp/) to ensure that the data created were consistent with these reporting tools.

The final version of the SMOKE-ready and RPO formatted hour-specific files for all days in the year 2002 were sent and received at CENRAP on October 28, 2004. The data were sent via CD and also included the VISTAS RPO and EPA CEM data for the year 2002.

6. Temporal Profile Analysis

UNC-CEP obtained year 2000, 2001 and 2003 CEM data from USEPA (http://cfpub.epa.gov/gdm/index.cfm?fuseaction=prepackaged.select) and also used the year 2002 CEM data mentioned in section E-1 to develop three (3) sets of temporal profiles for each individual unit. The sets of profiles are seasonal profiles, daily profiles by season, and hourly profiles by season. This analysis was performed for units in the CENRAP region that includes the following states: AR, IA, KS, LA, MN, MO, NE, OK, and TX. These profiles could then be used by CENRAP in future emission inventory/modeling applications.

Since emissions preprocessors can now support many thousand different temporal profiles (e.g., SMOKE can handle 99999 different profiles), we prepared individual boiler emission profiles for each of the CEM units in the states listed above. A total of 568 units were included in the preliminary analysis. At CENRAP's request, these individual unit emission profiles were prepared based on combined CEM data from years 2000, 2001 and 2002. We also included year 2003 CEM data to add more relevant and recent data to the analysis. The emission profiles were all based on the NO_x emissions only. There was little difference between the NO_x and SO_2 profiles, with the exception that a good percentage of number of the units had zero SO_2 emissions. We also targeted the analysis on the major-emitting units which was defined as units emitting at least 1 ton of NO_x per average day. This limitation allowed us to focus the analysis on the 344 "major-emitting" units (see Table 17). Three sets of individual unit profiles were prepared: emission fractions by month, emission fractions by day of the week, and emission fractions by hour of the day for a weekday, Saturday, Sunday, and weekend (Saturday and Sunday combined). Software was created to generate these profiles for each of the four seasons in SMOKE-ready format.

Table 17. Number of Units In Each State Where Temporal Profiles Were Generated

State	CEM units
Arkansas	12
Iowa	30
Kansas	21
Louisiana	30
Minnesota	26
Missouri	36
Nebraska	13
Oklahoma	30
Texas	146
Total	**344**

For the monthly emission profiles, the NO_x emissions were totaled by unit and month. The NO_x emissions from each unit for a given month were then divided by the total of the year 2000-2003 NO_x emissions from that unit. For the day of week profiles, the Gregorian date for each hourly CEM data record was converted to the corresponding Julian date. Then, I/OAPI libraries were used to assign day of the week (Monday, Tuesday, etc.) based on the Julian date. Next, NO_x emissions were totaled by day of the week for each unit. The NO_x emission totals at a given unit for each day of the week were normalized by dividing by the sum of the year 2000 through 2003 NO_x emission total for that unit. Similarly, NO_x emissions were totaled by hour and unit for all weekdays, Saturdays, Sundays and weekend days. The hourly profiles were also normalized by dividing by the sum of each hour for each particular day of interest for the 4-year CEM dataset. All profiles were based on local standard time data. This normalization technique was carried out for each of the four seasons (winter, spring, summer and fall) were the seasons were defined as follows:

- Winter–January, February; and March
- Spring–April, May and June
- Summer–July, August and September
- Fall– October, November and December

Previous CEM/temporal analysis studies (Pechan, 2003) have strived to generate a small set of temporal profiles to use for all units over a certain geographical area. While this is possible for this task, we recommend the profiles for the individual units be used. Each unit has many factors that effect temporal allocation of emissions including geographical region, seasonal demands and controls, population and technology changes, costs, and variations in weather from year to year. Emissions preprocessors can handle thousands of different profiles, therefore we recommend that these various factors be captured using the profiles for the individual units.

Figures 1 and 2 give examples of the monthly profiles generated from the 2000-2003 CEM data for the states of AR and NE. Figure 3 is an example of the weekly profiles generated for Arkansas for all four seasons. Figures 4 and 5 give example hourly profiles for Big Brown unit #1, TX and Dolet Hills unit #1, LA respectively. These are just samples of the numerous profiles

generated. All profiles delivered to CENRAP can easily be displayed by importing to MS Excel or other spreadsheet software.

National Weather Service temperature data were also obtained from UCAR (http://dss.ucar.edu/datasets/ds472.0/) for the time period of year 2000-2003. UNC-CEP continues to carry out the analysis of this data in order to determine its usefulness and/or its ability to provide better profile data than the individual unit profiles. We will provide our feedback on this analysis in the next version of this report. UNC-CEP also searched for reliable hourly stack flow databases. Hourly stack flow is not a required element to be reported to USEPA. Therefore, we did not find it on USEPA websites. We were also unable to find an hourly stack flow database that covered the desired years and region of interest.

F. Temporal, Speciation, and Spatial Allocation Profiles

1. Temporal Profiles for Point, Area, and Nonroad Sources

a. Data Sources (e.g., CEM)

CEP obtained the best available temporal profile data for emissions modeling from EPA (see also http://www.epa.gov/ttn/chief/emch/temporal/index.html), RPOs (e.g., MANE-VU), and other source-specific reports/databases (e.g., CEM data). A similar review of temporal profiles for the MANE-VU RPO and the EPA yielded the temporal profiles to be used in the review of the CENRAP emissions inventory dataset. This subsection describes the profile databases used for each component of the CENRAP emission inventory.

Point Sources

A similar review was carried out using the latest temporal profile dataset acquired from EPA on the MANE-VU inventory. Additional profiles were added during this review to support MANE-VU state- or county-specific point sources. We began the CENRAP review using the product (temporal profiles) of this MANE-VU EI review.

Additionally, the CEM data for the years 2000, 2001, 2002 and 2003 were used to come up with 4-year average temporal profiles for each major emitting unit (see also section E of this report). The CEM data were acquired from the following EPA website: http://cfpub.epa.gov/gdm/index.cfm?fuseaction=prepackaged.select.

The CENRAP emissions inventory was provided to us by Pechan in NIF 3.0. Additional data acquired from Pechan included periodic updates to the CENRAP inventory and complete listing of the SCCs in the inventory databases.

Figure 1. Arkansas CEM unit monthly profiles based on year 2000-2003 data.
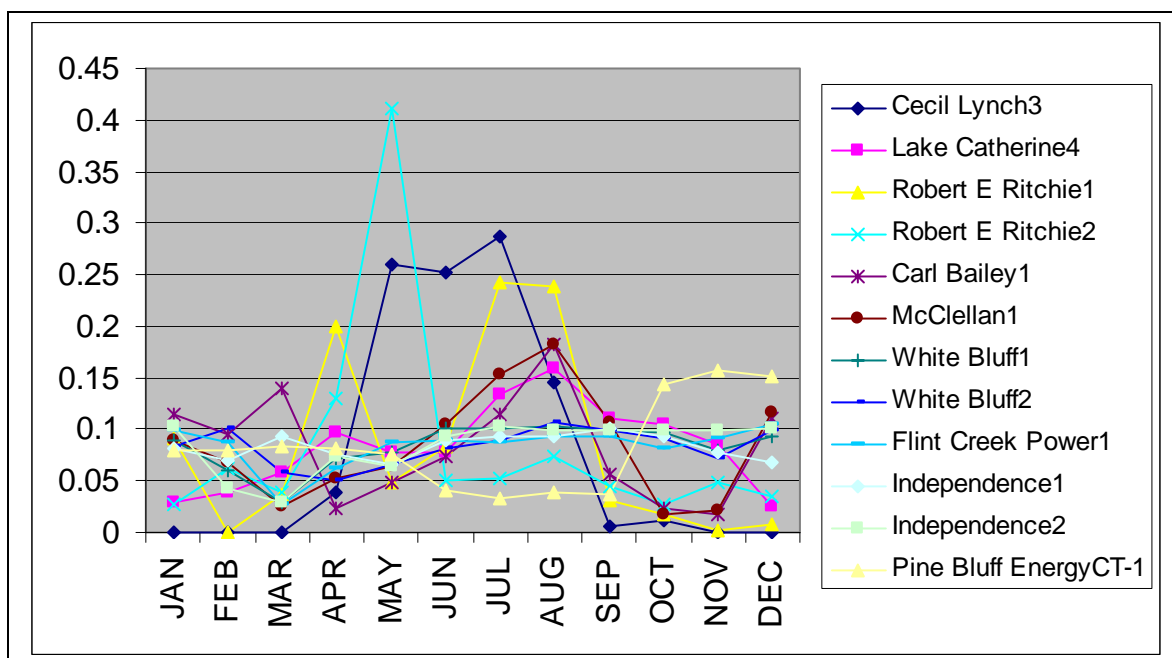
Figure 2. Nebraska CEM unit monthly profiles based on year 2000-2003 data.
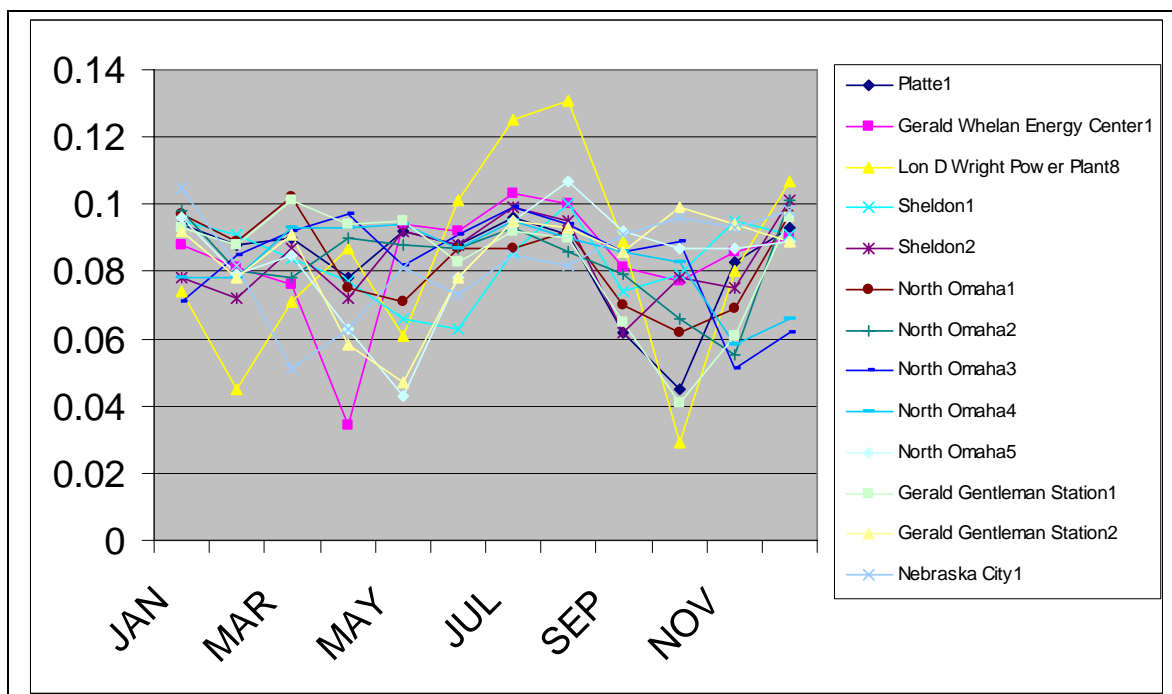
Figure 3. Arkansas weekly profiles for (a) winter, (b) spring, (c) summer and (d) autumn using the 2000-2003 data.

Figure 4. Big Brown Unit 1, Texas hourly profiles for winter for 2000-2003 data.
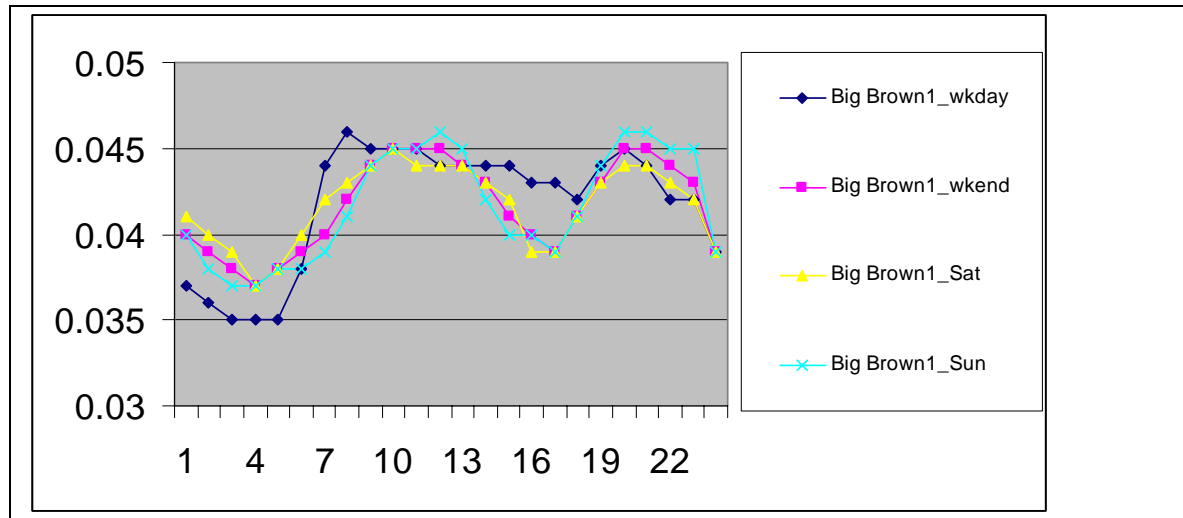
Figure 5. Dolet Hills Unit 1, Louisiana hourly profiles for autumn for 2000-2003 data.
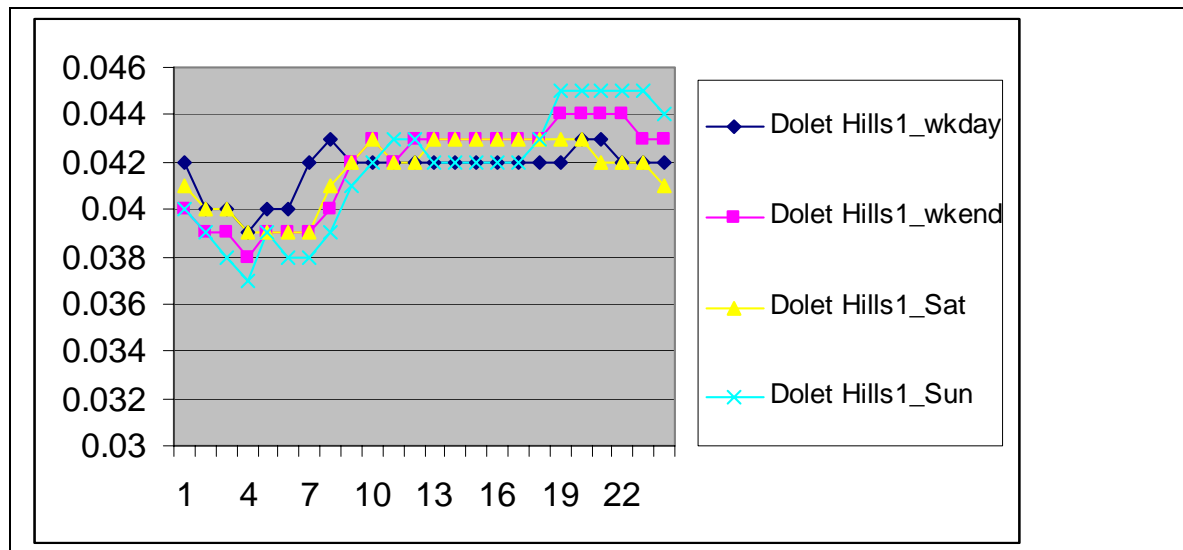
Area and Nonroad Sources

A similar review was carried out using the latest temporal profile dataset acquired from EPA on the MANE-VU inventory. Additional profiles were added during this review to support MANE-VU state- or county-specific area and nonroad sources. We began the CENRAP review using the product (temporal profiles) of this MANE-VU EI review.

Additionally, we used the final report (STI, 2003) generated for NH_3 emissions inventories to aide in the coming up with applicable temporal profiles for use with the CENRAP emissions inventory.

b.   Supplemental Data/Augmentation Procedures

A cross-reference table is necessary in order to appropriately apply the desired temporal profile to a certain emission source. This assignment or cross-reference is typically made by SCC, but can also be made for a specific FIPS-SCC combination or all SCCs in a FIPS region combination. For point sources, emissions modelers can also assign a specific temporal profile by a specific unit, stack, and/or facility identification. We conducted the review of CENRAP emissions inventory using the most recent temporal cross-reference table available that was the table generated during the MANE-VU review.

CEP identified SCCs that did not have a specific temporal profile assigned in the temporal cross-references file used in recent EPA and RPO applications. CEP created a new temporal cross-reference to an existing profile in the default SMOKE profiles for SCCs in the CENRAP; the cross-reference did not previously exist in the cross-reference file used at the beginning of the review (see Data Sources section) but the profile did exist.

All of the improvements to the SMOKE temporal cross-reference file and profiles that are summarized in this memo are included in the files *amptref.m3.cenrap.102804.txt* and *amptpro.m3.us+can.cenrap.102804.txt*, which were included as an electronic docket and delivered on October 28, 2004.

Table 18 summarizes the updates to entries in the default SMOKE cross-reference file for point sources and Table 19 for area/nonroad sources. The commonly assigned monthly profile is monthly profiles is 262 = uniform monthly. The most common weekly profiles are 7 = 'uniform emissions throughout the week' weekly and 5 = 'emit weekdays only' profile. The most common diurnal profiles are 12 = 12 hours per day during daylight hours and 26= maximum middle of the day; minimum early in morning. See the *amptpro.m3.us+can.cenrap.102804.txt file* for specific definitions of each profile.

These changes to the temporal cross-reference file have allowed us to apply a non-flat temporal profile (262= uniform monthly, 7=uniform weekly and 24=uniform diurnal) to ~90% of the SCCs in the point source inventory and ~95% of the SCCs in the area/nonroad source inventory. This is the best we could do with the information available to us at the time of the analysis.

Table 18. New Temporal Profile Assignments for CENRAP Point Source SCCs

State	SCC	Recommended Monthly, Weekly, and Diurnal Profiles			Method of Assignment	SCC Description
MN	30500245	262	7	6	30500242	Industrial Processes;Mineral Products;Asphalt Concrete;Mixers: Drum Mix Process ** (use 3-05-002-005 and subtypes)
MN	30500246	262	7	6	30500242	Industrial Processes;Mineral Products;Asphalt Concrete;Mixers: Drum Mix Process ** (use 3-05-002-005 and subtypes)
MN	30500247	262	7	6	30500242	Industrial Processes;Mineral Products;Asphalt Concrete;Mixers: Drum Mix Process ** (use 3-05-002-005 and subtypes)

Table 19. New Temporal Profile Assignments for CENRAP Area Source SCCs

SCC	Description	Month	Week	Diurnal	Recommendation Based on Profile Data for SCC	Description of Similar SCC used to Recommend Profiles
2310001000	Industrial Processes;Oil and Gas Production: SIC 13;All Processes : On-shore;Total: All Processes	262	7	26	2310000000	Industrial Processes;Oil and Gas Production: SIC 13;All Processes;Total: All Processes
2310002000	Industrial Processes;Oil and Gas Production: SIC 13;All Processes : Off-shore;Total: All Processes	262	7	26	2310000000	Industrial Processes;Oil and Gas Production: SIC 13;All Processes;Total: All Processes
2461870999	Solvent Utilization;Miscellaneous Non-industrial: Commercial;Pesticide Application: Non-Agricultural;Not Elsewhere Classified	258	7	26	2461800000	Solvent Utilization;Miscellaneous Non-industrial: Commercial;Pesticide Application: All Processes;Total: All Solvent Types
2805009200	Miscellaneous Area Sources;Agriculture Production - Livestock;Poultry production - broilers;Manure handling and storage	1500	7	26	2805009300	Miscellaneous Area Sources;Agriculture Production - Livestock;Poultry production - broilers;Land application of manure
2805021100	Miscellaneous Area Sources;Agriculture Production - Livestock;Dairy cattle - scrape dairy;Confinement	1500	7	26	2805021300	Miscellaneous Area Sources;Agriculture Production - Livestock;Dairy cattle - scrape dairy;Land application of manure
2805021200	Miscellaneous Area Sources;Agriculture Production - Livestock;Dairy cattle - scrape dairy;Manure handling and storage	1500	7	26	2805021300	Miscellaneous Area Sources;Agriculture Production - Livestock;Dairy cattle - scrape dairy;Land application of manure
2805023100	Miscellaneous Area Sources;Agriculture Production - Livestock;Dairy cattle - drylot/pasture dairy;Confinement	1500	7	26	2805023300	Miscellaneous Area Sources;Agriculture Production - Livestock;Dairy cattle - drylot/pasture dairy;Land application of manure
2805023200	Miscellaneous Area Sources;Agriculture Production - Livestock;Dairy cattle - drylot/pasture dairy;Manure handling and storage	1500	7	26	2805023300	Miscellaneous Area Sources;Agriculture Production - Livestock;Dairy cattle - drylot/pasture dairy;Land application of manure
2810020000	Miscellaneous Area Sources;Other Combustion;Prescribed Burning of Rangeland;Total	3	11	13	2810015000	Miscellaneous Area Sources;Other Combustion;Prescribed Burning for Forest Management;Total

We will augment the temporal profiles and cross-references delivered on Oct 28, 2004 with NH_3-specific temporal profiles using the STI final report on NH_3 sources. This will include monthly profiles for Texas and Arkansas and diurnal profiles for all states for applicable SCCs. The delivery of these profiles/cross-references is scheduled for early January 2005. The temporal profiles for each major emitting CEM unit based on a 4-year average (data from 2000 through 2003) were also delivered to CENRAP in January 2005.

2. Speciation Profiles for Point, Area, and Nonroad Sources

a. Data Sources

CEP obtained the best available speciation profile data for emissions modeling from EPA for the CB-IV with PM mechanism (see also http://www.epa.gov/ttn/chief/emch/speciation/index.html). The CENRAP emissions inventory was provided to us by Pechan in the NIF 3.0. Additional data acquired from Pechan included periodic updates to the CENRAP EI and complete listing of the SCCs in the inventory databases.

b. Supplemental Data/Augmentation Procedures

A cross-reference table is necessary in order to appropriately apply the desired speciation profile to a certain emission source. This assignment or cross-reference is typically made by SCC, but can also be made for a specific FIPS-SCC combination or all SCCs in a FIPS region combination. For point sources, emissions modelers can also assign a specific temporal profile by a specific unit, stack, and/or facility identification. We conducted the review of CENRAP emissions inventory using the most recent speciation cross-reference table available which was the table generated during the MANE-VU review.

Several SCCs in the CENRAP EI did not have chemical speciation profile assignments for the CB-IV with PM mechanism in the default SMOKE chemical cross-reference file. CEP added assignments for VOC speciation for the SCCs listed in Table 20 (area/nonroad sources) and Table 21 (point sources) to the speciation cross-reference file for compatibility with the CENRAP EI. The recommendations for these assignments are based on the speciation profile codes assigned to similar SCCs. We attempted to match the SCCs as accurately as possible, i.e. we looked for the closest SCC possible to supplement the missing assignment. The new chemical profile assignments were added to the file *gsref.cmaq.cb4p25.cenrap.102804.txt.* We did not make any changes to the speciation profiles file.

Please note that we understand that Pechan will soon be delivering some new PM and VOC profiles to EPA that are being incorporated into SPECIATE. Since some of these will have important implications for regional haze modeling, CENRAP may want to consider having these included in the modeling inventory. These profiles would take additional effort not already in the planned scope of work to implement. Some of the more important profiles will cover:

- Commercial Cooking (PM and VOC);
- Distillate and Natural Gas Fired Boilers (PM);
- Paved and Unpaved Road Dust;

- Motor Vehicle Exhaust/Tire Wear/Brake Wear; and
- Wildfires/Prescribed Burns.

Table 20. VOC Speciation Profiles Assigned to Area Source SCCs

SCC	Description	VOC	Recommendation Based on Profile Data for SCC	Description of Similar SCCs used to Recommend Profiles
2310001000	Industrial Processes;Oil and Gas Production: SIC 13;All Processes : On-shore;Total: All Processes	9015	2310000000	Industrial Processes;Oil and Gas Production: SIC 13;All Processes;Total: All Processes
2310002000	Industrial Processes;Oil and Gas Production: SIC 13;All Processes : Off-shore;Total: All Processes	9015	2310000000	Industrial Processes;Oil and Gas Production: SIC 13;All Processes;Total: All Processes
2461870999	Solvent Utilization;Miscellaneous Non-industrial: Commercial;Pesticide Application: Non-Agricultural;Not Elsewhere Classified	0076	2461850000	Solvent Utilization;Miscellaneous Non-industrial: Commercial;Pesticide Application: Agricultural;All Processes
2810020000	Miscellaneous Area Sources;Other Combustion;Prescribed Burning of Rangeland;Total	0307	2810015000	Miscellaneous Area Sources;Other Combustion;Prescribed Burning for Forest Management;Total

Table 21. VOC Speciation Profiles Assigned to Point Source SCCs

State	SCC	Recommended Profiles VOC	Method of Assignment	SCC Description (Complete Description not Always Available)
MN	30500245	0025	Use SCC=3050024X profiles	Industrial Processes;Mineral Products;Asphalt Concrete;Batch Mix Plant: Hot Elevators, Screens, Bins, Mixer & NG Rot Dryer
MN	30500246	0025	Use SCC=3050024X profiles	Industrial Processes;Mineral Products;Asphalt Concrete;Batch Mix Plant: Hot Elevators, Screens, Bins, Mixer& #2 Oil Rot Dryer
MN	30500247	0025	Use SCC=3050024X profiles	Industrial Processes;Mineral Products;Asphalt Concrete;Batch Mix Plant: Hot Elevs, Scrns, Bins, Mixer& Waste/Drain/#6 Oil Rot

3. Spatial Allocation Profiles for Area and Nonroad Sources

a. Data Sources

CEP obtained the best available spatial profile data for emissions modeling from EPA for the geographical area covered by the CENRAP 36-kilometer modeling domain (http://www.epa.gov/ttn/chief/emch/spatial/newsurrogate.html). A detailed description of this surrogate dataset is available at: http://www.epa.gov/ttn/chief/emch/spatial/new/surrogate_documentation_workbook052804.xls.

The CENRAP emissions inventory was provided to us by Pechan in the NIF 3.0. Additional data acquired from Pechan included periodic updates to the CENRAP EI and complete listing of the SCCs in the inventory databases.

b.   Supplemental Data/Augmentation Procedures

A cross-reference table is necessary in order to appropriately apply the desired spatial allocation profile to a certain emission source. This assignment or cross-reference is typically made by SCC, but can also be made for a specific FIPS-SCC combination or all SCCs in a FIPS region combination. We conducted the review of CENRAP emissions inventory using the most recent speciation cross-reference table available which was the table generated during the MANE-VU review.

Several SCCs in the CENRAP area source EI did not have surrogate assignments in the default SMOKE gridding cross-reference file. These SCCs would be assigned the default surrogate which is population when spatially allocating emissions in emissions processing applications. CEP added spatial profile assignments for the SCCs listed in Table 22 to the gridding cross-reference file for compatibility with the CENRAP EI. The recommendations for these assignments are based on matching surrogate descriptions from the EPA surrogate data descriptions (see http://www.epa.gov/ttn/chief/emch/spatial/new/surrogate_documentation_workbook052804.xls) with the SCC descriptions. The new surrogate assignments were added to the file *amgref.m3.us+can+mex.cenrap.102804.txt* and included as part of the electronic docket delivered on October 28, 2004. CENRAP contractors already have a surrogate dataset for the 36-kilometer modeling domain using the EPA surrogate database. We are awaiting final definition of the CENRAP 12-kilometer domain(s) before delivering spatial surrogates to CENRAP.

Table 22. Surrogate profiles assigned to SCCs to support CENRAP EI

SCC	Description	Surrogate profile	Surrogate Description
2310001000	Industrial Processes;Oil and Gas Production: SIC 13;All Processes : On-shore;Total: All Processes	585	Metals and Minerals Industrial (IND4)
2310002000	Industrial Processes;Oil and Gas Production: SIC 13;All Processes : Off-shore;Total: All Processes	585	Metals and Minerals Industrial (IND4)
2311000000	Industrial Processes;Construction: SIC 15 - 17;All Processes;Total	140	Housing Change and Population
2461022999	Solvent Utilization;Miscellaneous Non-industrial: Commercial;Emulsified Asphalt;Solvents: NEC	140	Housing Change and Population
2461870999	Solvent Utilization;Miscellaneous Non-industrial: Commercial;Pesticide Application: Non-Agricultural;Not Elsewhere Classified	515	Commercial plus Institutional Land
2535010000	Storage and Transport;Bulk Materials Transport;Rail Car;Total: All Products	260	Total Railroad Miles
2810040000	Miscellaneous Area Sources;Other Combustion;Aircraft/Rocket Engine Firing and Testing;Total	700	Airport Area

4.   QA Review of Final Data Sets

Table 23 lists the spatial, temporal and speciation allocation profiles and cross-reference tables, technical memoranda and other ancillary data delivered to CENRAP on October 28, 2004. Table 24 lists the sources and other attributes of the ancillary data collected and reviewed including the temporal profiles generated using the CEM data for years 2000-2003. All of the data files were QA reviewed twice by ensuring that no default profiles are being used and the data are in the correct format for use in the emissions models. The following data may be updated in early 2005 to incorporate more recent information:

- NH_3 temporal profile updates
- Spatial surrogates for the 12- kilometer modeling domain(s) once defined by CENRAP
- 4-year average temporal profiles for each major emitting CEM unit

These data will also be quality assured in a similar manner (no default profiles being used, correct format, etc.). Most of the data presented in this section have been delivered with a few additional data sets to be delivered in January 2005. These additional data sets are mentioned in this section. The next version of this report will include any necessary documentation associated with the supplemental deliverables.

Table 23. Spatial, Temporal and Speciation Allocation Data and Memos

Bytes	Date Created	Time Created	Filename
90209	10/28/2004	10:55	task8_final/amgref.m3.us+can+mex.cenrap.102804.txt
115493	10/28/2004	10:55	task8_final/amptpro.m3.us+can.cenrap.102804.txt
650073	10/28/2004	10:55	task8_final/amptref.m3.cenrap.102804.txt
75776	10/28/2004	10:54	task8_final/CENRAP_AreaEI_profile_review_task8_final.doc
135810	10/28/2004	10:55	task8_final/CENRAP_AreaEI_profile_review_task8_final.pdf
48640	10/28/2004	10:54	task8_final/CENRAP_PointEI_profile_review_task8_final.doc
146830	10/28/2004	10:55	task8_final/CENRAP_PointEI_profile_review_task8_final.pdf
142013	9/16/2004	18:14	task8_final/gspro.cmaq.cb4p25.txt
754816	10/28/2004	10:55	task8_final/gsref.cmaq.cb4p25.cenrap.102804.txt
501	10/28/2004	10:56	task8_final/README.txt
1324273	9/16/2004	18:13	task8_final/scc_desc.txt

Table 24. Ancillary Data Descriptions

File Name	Purpose	Format	Source	Possible Deficiencies	Date Delivered
amgref.m3.us+can+mex.cenrap.102804.txt	Spatial profile cross-reference	SMOKE	USEPA, MANE-VU and other reviews/applications	NH3 specific surrogates could be developed using landuse databases like BELD3	28-Oct-04
amptpro.m3.us+can.cenrap.102804.txt	Temporal profiles	SMOKE	USEPA, MANE-VU and other reviews/applications.	NH3 specific temporal profiles will be added soon	28-Oct-04
amptref.m3.cenrap.102804.txt	Temporal profile cross-reference	SMOKE	USEPA, MANE-VU and other reviews/applications	NH3 specific temporal profiles will be added soon	28-Oct-04
gspro.cmaq.cb4p25.txt	Speciation profiles for CB-IV with PM	SMOKE	USEPA: SMOKE v2 release	SPECIATE 4 data could be available soon	28-Oct-04
gsref.cmaq.cb4p25.cenrap.102804.txt	Speciation cross-references for CB-IV with PM	SMOKE	USEPA, MANE-VU and other reviews/applications	SPECIATE 4 data could be available soon	28-Oct-04
scc_desc.txt	SCC description	SMOKE	USEPA: SMOKE v2 release	Could be missing some SCC descriptions	28-Oct-04
amgref.m3.us+can+mex.cenrap.102804.rpo	Spatial profile cross-reference	RPO	USEPA, MANE-VU and other reviews/applications	NH3 specific surrogates could be developed using landuse databases like BELD3	Coming soon
amptpro.m3.us+can.cenrap.102804.rpo	Temporal profiles	RPO	USEPA, MANE-VU and other reviews/applications.	NH3 specific temporal profiles will be added soon	Coming soon
amptref.m3.cenrap.102804.rpo	Temporal profile cross-reference	RPO	USEPA, MANE-VU and other reviews/applications	NH3 specific temporal profiles will be added soon	Coming soon
gspro.cmaq.cb4p25.rpo	Speciation profiles for CB-IV with PM	RPO	USEPA: SMOKE v2 release	SPECIATE 4 data could be available soon	Coming soon
gsref.cmaq.cb4p25.cenrap.102804.rpo	Speciation cross-references for CB-IV with PM	RPO	USEPA, MANE-VU and other reviews/applications	SPECIATE 4 data could be available soon	Coming soon
ptpro.cem_winter.cenrap.2000-03.txt	Temporal profiles for CEM units	SMOKE	http://cfpub.epa.gov/gdm/index.cfm?fuseaction=prepackaged.select	Based on 4 yr (2000-2003) average profiles	Coming soon
ptpro.cem_spring.cenrap.2000-03.txt	Temporal profiles for CEM units	SMOKE	http://cfpub.epa.gov/gdm/index.cfm?fuseaction=prepackaged.select	Based on 4 yr (2000-2003) average profiles	Coming soon
ptpro.cem_summer.cenrap.2000-03.txt	Temporal profiles for CEM units	SMOKE	http://cfpub.epa.gov/gdm/index.cfm?fuseaction=prepackaged.select	Based on 4 yr (2000-2003) average profiles	Coming soon
ptpro.cem_autumn.cenrap.2000-03.txt	Temporal profiles for CEM units	SMOKE	http://cfpub.epa.gov/gdm/index.cfm?fuseaction=prepackaged.select	Based on 4 yr (2000-2003) average profiles	Coming soon

G. Preparation of SMOKE/IDA and RPO Data Exchange Protocol (NIF 3.0) Formats

This section describes the inventory and SMOKE emission processor files prepared under this project. The Excel Workbook file named "CENRAP Inventory File Documentation _030405.xls" provides the names of the files delivered, as well as other file information useful for transferring data to air quality modeling centers. This Excel Workbook file is provided along with this report. The following Table 25 provides a summary of the files delivered.

The ancillary data (described in section F) that are necessary input for emissions preprocessors have been formatted for use in SMOKE and in the RPO Data Exchange Protocol format. Table 26 lists the profiles, cross-reference tables, and other ancillary data (SCC descriptions) that have been provided to CENRAP. The data have undergone a review which is described in section F and in technical memoranda sent to CENRAP on October 28, 2004.

Table 25. Summary of Mass Emissions and SMOKE Input Files

S/L/T Agencies Included in Files	NIF 3.0 File Name Containing Mass Emissions Inventory (Access 2000 Database Files)	Temporal Period of Mass Emissions Inventory	SMOKE/IDA File Name	Temporal Period of Emissions in SMOKE/IDA File	Notes
Point Source Inventory					
AR, IA, KS, LA, MN, MO, NE, OK, TX, Local, and Tribal	CENRAP_2002_Point_021605.mdb	Annual	CENRAP_POINT_SMOKE_INPUT_ANNUAL_DAILY_021805.txt	Annual for all agencies; Daily for MO and TX	Includes all sectors supplied by S/L/T agencies. Tribal inventory is for Fond du Lac Band of the Minnesota Chippewa Tribe. Local inventories include Lancaster County (Lincoln) and Douglas County (Omaha), NE
MO and TX	CENRAP_2002_Point_Daily_Missouri_Texas_20050216.mdb	Daily	CENRAP_POINT_SMOKE_INPUT_ANNUAL_DAILY_021805.txt	"	Daily emissions for MO and TX are included in the SMOKE/IDA file containing annual emissions for all CENRAP agencies, but placed in a NIF 3.0 file separate from the NIF 3.0 file containing the annual emissions.
Nonroad Source Inventory					
AR, IA, KS, LA, MN, MO, NE, OK, TX	CENRAP_2002_Nonroad_030305.mdb	Annual and Daily	CENRAP_NONROAD_SMOKE_INPUT_ANN_STATE_030405.txt	Annual	Includes NONROAD Model Categories and Aircraft, Commercial Marine Vessels, and Railroad Locomotives. NONROAD Model inventory is from CENRAP-sponsored inventory except for TX who supplied its own NONROAD Model Inventory. MN included commercial and military aircraft and auxiliary power units in its point source inventory; therefore, the nonroad inventory does not contain emissions for these categories in MN.
Area Source Inventory					
AR, IA, KS, LA, MN, MO, NE, OK, TX	CENRAP_2002_Area_022205.mdb	Annual, Daily, and Monthly	CENRAP_AREA_SMOKE_INPUT_ANN_STATE_022205.txt	Annual	Includes all sectors except for those included in the Area Misc files. Planned burning emissions from CENRAP-sponsored area source inventory are excluded for IA, KS, LA, MN, MO, OK, and NE (except for Lancaster County [FIPS 31109]); the SMOKE files for the CENRAP planned burning inventory will be used for these states.
IA, KS, LA, MN, MO, NE, OK	"	"	CENRAP_AREA_SMOKE_INPUT_NH3_MONTH_JAN_120304.txt	Monthly Emissions x 12	All sectors except for those included in the Area Misc files. Monthly emissions are multiplied by 12 (months).
IA, KS, LA, MN, MO, NE, OK	"	"	CENRAP_AREA_SMOKE_INPUT_NH3_MONTH_FEB_120304.txt	Monthly Emissions x 12	All sectors except for those included in the Area Misc files. Monthly emissions are multiplied by 12 (months).
IA, KS, LA, MN, MO, NE, OK	"	"	CENRAP_AREA_SMOKE_INPUT_NH3_MONTH_MAR_120304.txt	Monthly Emissions x 12	All sectors except for those included in the Area Misc files. Monthly emissions are multiplied by 12 (months).

Table 25 (continued)

S/L/T Agencies Included in Files	NIF 3.0 File Name Containing Mass Emissions Inventory (Access 2000 Database Files)	Temporal Period of Mass Emissions Inventory	SMOKE/IDA File Name	Temporal Period of Emissions in SMOKE/IDA File	Notes
Area Source Inventory (continued)					
IA, KS, LA, MN, MO, NE, OK	"	"	CENRAP_AREA_SMOKE_INPUT_NH3_MONTH_APR_120304.txt	Monthly Emissions x 12	All sectors except for those included in the Area Misc files. Monthly emissions are multiplied by 12 (months).
IA, KS, LA, MN, MO, NE, OK	"	"	CENRAP_AREA_SMOKE_INPUT_NH3_MONTH_MAY_120304.txt	Monthly Emissions x 12	All sectors except for those included in the Area Misc files. Monthly emissions are multiplied by 12 (months).
IA, KS, LA, MN, MO, NE, OK	"	"	CENRAP_AREA_SMOKE_INPUT_NH3_MONTH_JUN_120304.txt	Monthly Emissions x 12	All sectors except for those included in the Area Misc files. Monthly emissions are multiplied by 12 (months).
IA, KS, LA, MN, MO, NE, OK	"	"	CENRAP_AREA_SMOKE_INPUT_NH3_MONTH_JUL_120304.txt	Monthly Emissions x 12	All sectors except for those included in the Area Misc files. Monthly emissions are multiplied by 12 (months).
IA, KS, LA, MN, MO, NE, OK	"	"	CENRAP_AREA_SMOKE_INPUT_NH3_MONTH_AUG_120304.txt	Monthly Emissions x 12	All sectors except for those included in the Area Misc files. Monthly emissions are multiplied by 12 (months).
IA, KS, LA, MN, MO, NE, OK	"	"	CENRAP_AREA_SMOKE_INPUT_NH3_MONTH_SEP_120304.txt	Monthly Emissions x 12	All sectors except for those included in the Area Misc files. Monthly emissions are multiplied by 12 (months).
IA, KS, LA, MN, MO, NE, OK	"	"	CENRAP_AREA_SMOKE_INPUT_NH3_MONTH_OCT_120304.txt	Monthly Emissions x 12	All sectors except for those included in the Area Misc files. Monthly emissions are multiplied by 12 (months).
IA, KS, LA, MN, MO, NE, OK	"	"	CENRAP_AREA_SMOKE_INPUT_NH3_MONTH_NOV_120304.txt	Monthly Emissions x 12	All sectors except for those included in the Area Misc files. Monthly emissions are multiplied by 12 (months).
IA, KS, LA, MN, MO, NE, OK	"	"	CENRAP_AREA_SMOKE_INPUT_NH3_MONTH_DEC_120304.txt	Monthly Emissions x 12	All sectors except for those included in the Area Misc files. Monthly emissions are multiplied by 12 (months).
Fond du Lac Band of the Minnesota Chippewa Tribe	"	"	CENRAP_AREA_SMOKE_INPUT_ANN_TRIBE_120704.txt	Annual	Includes emissions for the paved and unpaved road and prescribed burning area source categories.
AR, TX, and Lancaster County, NE	"	"	CENRAP_AREA_BURNING_SMOKE_INPUT_ANN_TX_AR_NELI_120704.txt	Annual	Includes state and local prepared planned burning emissions. SMOKE input files for area source planned burning emissions for all other states are available from CENRAP-sponsored inventory.

Table 25 (continued)

S/L/T Agencies Included in Files	NIF 3.0 File Name Containing Mass Emissions Inventory (Access 2000 Database Files)	Temporal Period of Mass Emissions Inventory	SMOKE/IDA File Name	Temporal Period of Emissions in SMOKE/IDA File	Notes
Area Miscellaneous Source Inventory					
AR, IA, KS, LA, MN, MO, NE, OK, TX	CENRAP_2002_Area_Misc_120804.mdb	Annual, Daily, and Monthly	CENRAP_AREA_MISC_SMOKE_INPUT_ANN_STATE_120704.txt	Annual	Natural Sources and Two On-road Mobile SCCs from CMU Model
IA, KS, LA, MN, MO, NE, OK	"	"	CENRAP_AREA_MISC_SMOKE_INPUT_NH3_MONTH_JAN_120304.txt	Monthly Emissions x 12	Natural Sources and Two On-road Mobile SCCs from CMU Model. Monthly emissions are multiplied by 12 (months).
IA, KS, LA, MN, MO, NE, OK	"	"	CENRAP_AREA_MISC_SMOKE_INPUT_NH3_MONTH_FEB_120304.txt	Monthly Emissions x 12	Natural Sources and Two On-road Mobile SCCs from CMU Model. Monthly emissions are multiplied by 12 (months).
IA, KS, LA, MN, MO, NE, OK	"	"	CENRAP_AREA_MISC_SMOKE_INPUT_NH3_MONTH_MAR_120304.txt	Monthly Emissions x 12	Natural Sources and Two On-road Mobile SCCs from CMU Model. Monthly emissions are multiplied by 12 (months).
IA, KS, LA, MN, MO, NE, OK	"	"	CENRAP_AREA_MISC_SMOKE_INPUT_NH3_MONTH_APR_120304.txt	Monthly Emissions x 12	Natural Sources and Two On-road Mobile SCCs from CMU Model. Monthly emissions are multiplied by 12 (months).
IA, KS, LA, MN, MO, NE, OK	"	"	CENRAP_AREA_MISC_SMOKE_INPUT_NH3_MONTH_MAY_120304.txt	Monthly Emissions x 12	Natural Sources and Two On-road Mobile SCCs from CMU Model. Monthly emissions are multiplied by 12 (months).
IA, KS, LA, MN, MO, NE, OK	"	"	CENRAP_AREA_MISC_SMOKE_INPUT_NH3_MONTH_JUN_120304.txt	Monthly Emissions x 12	Natural Sources and Two On-road Mobile SCCs from CMU Model. Monthly emissions are multiplied by 12 (months).
IA, KS, LA, MN, MO, NE, OK	"	"	CENRAP_AREA_MISC_SMOKE_INPUT_NH3_MONTH_JUL_120304.txt	Monthly Emissions x 12	Natural Sources and Two On-road Mobile SCCs from CMU Model. Monthly emissions are multiplied by 12 (months).
IA, KS, LA, MN, MO, NE, OK	"	"	CENRAP_AREA_MISC_SMOKE_INPUT_NH3_MONTH_AUG_120304.txt	Monthly Emissions x 12	Natural Sources and Two On-road Mobile SCCs from CMU Model. Monthly emissions are multiplied by 12 (months).
IA, KS, LA, MN, MO, NE, OK	"	"	CENRAP_AREA_MISC_SMOKE_INPUT_NH3_MONTH_SEP_120304.txt	Monthly Emissions x 12	Natural Sources and Two On-road Mobile SCCs from CMU Model. Monthly emissions are multiplied by 12 (months).
IA, KS, LA, MN, MO, NE, OK	"	"	CENRAP_AREA_MISC_SMOKE_INPUT_NH3_MONTH_OCT_120304.txt	Monthly Emissions x 12	Natural Sources and Two On-road Mobile SCCs from CMU Model. Monthly emissions are multiplied by 12 (months).
IA, KS, LA, MN, MO, NE, OK	"	"	CENRAP_AREA_MISC_SMOKE_INPUT_NH3_MONTH_NOV_120304.txt	Monthly Emissions x 12	Natural Sources and Two On-road Mobile SCCs from CMU Model. Monthly emissions are multiplied by 12 (months).
IA, KS, LA, MN, MO, NE, OK	"	"	CENRAP_AREA_MISC_SMOKE_INPUT_NH3_MONTH_DEC_120304.txt	Monthly Emissions x 12	Natural Sources and Two On-road Mobile SCCs from CMU Model. Monthly emissions are multiplied by 12 (months).

Table 26. Profiles, Cross-Reference Tables, and Other Ancillary Data Provided to CENRAP that can be used with Emissions Preprocessors/Models (e.g. SMOKE, CONCEPT)

Filename	Purpose	Format[1]
amgref.m3.us+can+mex.cenrap.102804.txt	Spatial profile cross-reference	SMOKE
amptpro.m3.us+can.cenrap.102804.txt	Temporal profiles	SMOKE
amptref.m3.cenrap.102804.txt	Temporal profile cross-reference	SMOKE
gspro.cmaq.cb4p25.txt	Speciation profiles for CB-IV with PM	SMOKE
gsref.cmaq.cb4p25.cenrap.102804.txt	Speciation cross-references for CB-IV with PM	SMOKE
scc_desc.txt	SCC description	SMOKE
amgref.m3.us+can+mex.cenrap.102804.rpo	Spatial profile cross-reference	RPO
amptpro.m3.us+can.cenrap.102804.rpo	Temporal profiles	RPO
amptref.m3.cenrap.102804.rpo	Temporal profile cross-reference	RPO
gspro.cmaq.cb4p25.rpo	Speciation profiles for CB-IV with PM	RPO
gsref.cmaq.cb4p25.cenrap.102804.rpo	Speciation cross-references for CB-IV with PM	RPO

[1] RPO = Regional Planning Organization (PRO) Data Exchange Protocol.

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III. SUMMARIES OF EMISSIONS INVENTORIES FOR THE CENRAP REGION

Summaries of emissions were prepared from the emission inventory files for each sector and for all sectors combined. The summaries are provided in an Access 2000 database named "CENRAP Emission Summaries_030805.mdb". Table 27 identifies and briefly describes the contents of the emissions summary tables included in the database. The nonroad source sector summaries include emissions for aircraft, commercial marine vessels, and locomotives as well as the emissions from the NONROAD model categories. The onroad summaries were prepared from the CENRAP-sponsored inventory for onroad sources. Tables 1G, 2C, 3C, 4C, and 5C include the data source code for the area, point, nonroad, and onroad sectors to assist in identifying the origin and year of emissions inventory data. The data source codes were defined previously in Chapter II of this report.

The summaries in Appendix A of this report are taken from the emissions summary Table 2D. However, emissions summary Table 2D includes natural sources/biogenic NH_3 emissions and geogenic PM10-PRI and PM25-PRI emissions. The biogenic and geogenic emissions were excluded from the summary tables included in Chapter I of the report. Thus, the biogenic and geogenic emissions were excluded from the NH_3 and PM10-PRI and PM25-PRI summaries in Appendix A so that the total emissions in the Appendix A summaries match the total emissions in the summaries in Chapter I of the report.

Table 27. Emissions Summaries

Summary Table Name	Description
All Sector Summaries	
Table 1A_All Sectors	Summary of Annual Emissions by Pollutant and Sector for the CENRAP Region
Table 1B_All Sectors	Summary of Annual Emissions by State FIPS/Tribal Code/State Name/Tribal Name/Pollutant and Sector
Table 1C_All Sectors	Summary of Annual Emissions by State FIPS/Tribal Code/State Name/Tribal Name/County FIPS/County Name/Pollutant and Sector
Table 1D_All Sectors	Summary of Annual Emissions by Category/Sector and Pollutant for the CENRAP Region
Table 1E_All Sectors	Summary of Annual Emissions by State FIPS/Tribal Code/State Name/Tribal Name/ Source Category Name and Number/Sector and Pollutant
Table 1F_All Sectors	Summary of Annual Emissions by State FIPS/Tribal Code/State Name/Tribal Name/County FIPS/County Name/Source Category Name and Number/Sector and Pollutant
Table 1G_All Sectors	Summary of Annual Emissions by State FIPS/Tribal Code/State Name/Tribal Name/County FIPS/County Name/SCC and SCC Description/Source Category Name and Number/ Sector/Pollutant and Data Source Code

Table 27 (continued)

Summary Table Name	Description
Area Source and Biogenic/Natural Source Sector Summaries	
Table 2A_Area Sources	Summary of Annual Emissions by State FIPS/Tribal Code/State Name/Tribal Name and Pollutant
Table 2B_Area Sources	Summary of Annual Emissions by State FIPS/Tribal Code/State Name/Tribal Name/County FIPS/County Name and Pollutant
Table 2C_Area Sources	Summary of Annual Emissions and Data Source Codes by State FIPS/Tribal Code/State Name/Tribal Name/County FIPS/County Name/SCC/SCC Description and Pollutant
Table 2D_Area Sources	Summary of Annual Emissions by SCC/SCC Description/Pollutant and State/Tribe
Table 2E_Area Sources	Summary of Annual Emissions by Pollutant and State/Tribe
Point Source Sector Summaries	
Table 3A_Point Sources	Summary of Annual Emissions by State FIPS/Tribal Code/State Name/Tribal Name and Pollutant
Table 3B_Point Sources	Summary of Annual Emissions by State FIPS/Tribal Code/State Name/Tribal Name/County FIPS/County Name and Pollutant
Table 3C_Point Sources	Summary of Annual Emissions and Data Source Codes by State FIPS/Tribal Code/State Name/Tribal Name/County FIPS/County Name/SCC/SCC Description and Pollutant
Table 3D_Point Sources	Summary of Annual Emissions by SCC/SCC Description/Pollutant and State/Tribe
Table 3E_Point Sources	Summary of Annual Emissions by Pollutant and State/Tribe
Table 3F_Point Sources	Facility-level Summary
Nonroad Source Sector Summaries	
Table 4A_Nonroad Sources	Summary of Annual Emissions by State FIPS/State Name and Pollutant
Table 4B_Nonroad Sources	Summary of Annual Emissions by State FIPS/State Name/County FIPS/County Name and Pollutant
Table 4C_Nonroad Sources	Summary of Annual Emissions and Data Source Codes by State FIPS/State Name/County FIPS/County Name/SCC/SCC Description and Pollutant
Table 4D_Nonroad Sources	Summary of Annual Emissions by SCC/SCC Description/Pollutant and State
Table 4E_Nonroad Sources	Summary of Annual Emissions by Pollutant and State
Onroad Source Sector Summaries	
Table 5A_Onroad Sources	Summary of Annual Emissions by State FIPS/State Name and Pollutant
Table 5B_Onroad Sources	Summary of Annual Emissions by State FIPS/State Name/County FIPS/County Name and Pollutant
Table 5C_Onroad Sources	Summary of Annual Emissions and Data Source Codes by State FIPS/State Name/County FIPS/County Name/SCC/SCC Description and Pollutant
Table 5D_Onroad Sources	Summary of Annual Emissions by SCC/SCC Description/Pollutant and State
Table 5E_Onroad Sources	Summary of Annual Emissions by Pollutant and State

IV. METHODS FOR AREAS OUTSIDE OF THE CENRAP REGION

A. Data Sources

This task involved gathering and consolidating point and area source emissions data for areas outside the CENRAP region. The sources of data included emissions inventories compiled by the other RPOs, the EPA, Environment Canada, Texas Commission on Environmental Quality (TCEQ), and other applications (e.g., Big Bend Regional Aerosol and Visibility Observational (BRAVO)). CENRAP indicated to UNC-CEP the definition of the 36-kilometer modeling domain would have the following definition:

       NCOLS = 148
       NROWS = 112
       GDTYP = 2 (Lambert conformal)
       P_ALP = 33.
       P_BET = 45.
       P_GAM = -97.
       XCENT = -97.
       YCENT = 40.
       XORIG = -2736000.
       YORIG = -2088000.
       XCELL = 36000.
       YCELL = 36000.

This modeling domain definition is also illustrated in Figure 6.

Figure 6. The CENRAP 36-kilometer modeling domain.
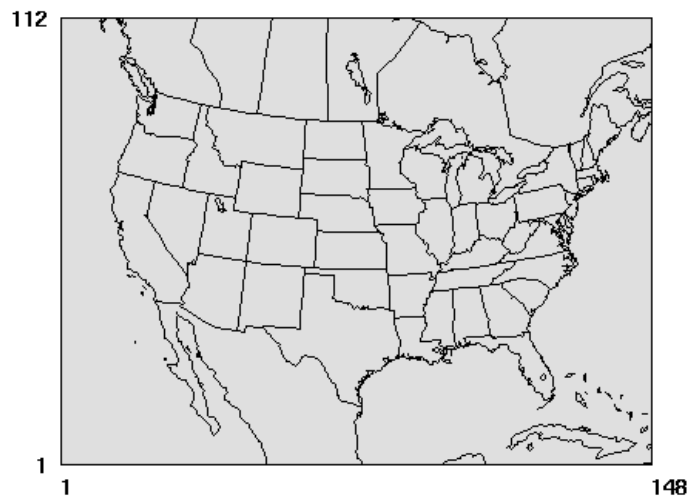
We used this 36-kilometer domain definition to come up with the geographical areas outside of the CENRAP states where inventory data are needed for CENRAP modeling applications.

We contacted the VISTAS and WRAP RPOs and were able to acquire year 2002 point, area and nonroad inventory data for their respective states. The data acquired was being used in their most recent modeling applications, however they did inform us that updates to the 2002 inventory are likely in near future. As of late December 2004, the Midwest RPO did not have a "final" version of their 2002 inventory to release for use by other RPOs. MANE-VU RPO's point, area, onroad, and nonroad inventories were finalized at the end of January 2005 and made available to other RPOs in February 2005.

The Mexican inventory databases available were the 1999 inventory used in the BRAVO modeling application and an updated inventory being developed by another contractor (Eastern Research Group [ERG]). We were not able to obtain the updated inventory from ERG. Moreover, the point source inventory will most likely be proprietary and could require a non-discloser agreement. Since we could not obtain this data, we recommend using the BRAVO inventories for the areas of the CENRAP modeling domain(s) that includes regions of Mexico.

The Canadian inventory databases from Environment Canada available are a 1995 inventory and a recently release year 2000 inventory. The point source data are proprietary, therefore, the data for year 2000 were not immediately available and the 1995 point source inventory can't be used by CENRAP unless their contractors get permission from Environment Canada to do so. However, we were able to obtain the area, nonroad, and mobile source inventories for the year 2000 from Environment Canada. We were able to reformat the data for use in SMOKEv2 and produce emissions total reports. These reports did not match up with the emission inventory totals Environment Canada provided with the data. The EPA and UNC-CEP found many problems with the year 2000 data including a lack of subprovince codes for better spatial allocation of emissions and different set of SCCs in the ASCII version of the inventory vs. the Microsoft Access version of the inventory. We reported these issues to Environment Canada and very recently (late December 2004) received another version of this inventory. We are now beginning to QA this new version. However, we recommend using the year 1995 area, nonroad and mobile source inventories until confidence in the year 2000 data can be acquired.

The Minerals Management Services (MMS) recently released a year 2000 Gulfwide Emissions Inventory (GWEI) which is available at the following website:

http://www.gomr.mms.gov/homepg/regulate/environ/airquality/gulfwide_emission_inventory/2000GulfwideEmissionInventory.html

This inventory dataset includes platform (treated as point sources) and non-platform (treated as area sources) sources for most of the Gulf of Mexico. TCEQ and other contractors (Environ and ERG) provided UNC-CEP with ancillary and sample MMS inventories for an average August 2000 day in Emissions Preprocessor System version 3 (EPS3) format. UNC-CEP was able to use these ancillary data and the raw MMS data to create annual inventory in SMOKE IDA format for the non-platform sources and an average August 2000 inventory in SMOKE IDA format for the platform sources. Generating an annual platform inventory will require additional

ancillary data to be acquired from TCEQ. TCEQ is working on providing this data. UNC-CEP will generate the year 2000 annual inventory for platform sources as soon as this ancillary data are acquired. Additional ancillary data necessary in order to use the MMS SMOKE IDA inventories in emissions modeling were also generated. This ancillary data includes spatial surrogates for the CENRAP 36-kilometer grid (Figure 6), temporal profiles, and spatial and temporal cross-references. These data have been provided to CENRAP for use in emissions modeling applications for both the non-platform and platform inventories. Additional technical details about these MMS inventories were provided with the data to help emissions modelers understand and properly apply the inventory and ancillary data.

All of the data and associated emissions summaries described in this section were delivered to CENRAP on December 27, 2004. Table 28 provides a list of the deliverables, the date acquired, the sources used to assemble the data, the contractor(s) and/or organizations that assembled the data, possible deficiencies of the data, time period of the data (e.g., year 2002), and other necessary information needed to enable CENRAP to best understand the databases that are available. Draft summaries of point and area source emissions data for these data obtained for areas outside of CENRAP were generated and provided with the December 27, 2004 deliverables.

B. Supplemental Data/Augmentation Procedures

The supplemental data needed to run SMOKE were provided to CENRAP and described in detail in section F of this report. Additional ancillary data to support the data sets described in the previous section (IV.A) were provided to CENRAP on December 27, 2004. This mainly included specific spatial profile and cross-references and temporal cross-references for the Minerals Management Service (MMS) inventories, but also included better default stack parameters for Mexican point sources. Table 29 includes a listing of all files provided to CENRAP on December 27, 2004.

Table 28. Description of Inventory Data Provided to CENRAP

Geographic Region/RPO	Raw Data	Time Period	Raw Data Format	Date Received	Source of Data	Source of Ancillary Data	Possible Deficiencies	Date Data and Summaries Delivered to CENRAP
VISTAS	Point, area and nonroad	2002	SMOKE IDA	24-Aug-04	Gregory Stella, Alpine Geophysics	Gregory Stella, Alpine Geophysics	Possibly updated inventory coming soon	27-Dec-04
WRAP	Point, area and nonroad	2002	SMOKE IDA	1-Dec-04	Tom Moore, Colorado St and Zac Adelman, UNC-CEP	Tom Moore, Colorado St and Zac Adelman, UNC-CEP	Possibly updated inventory coming soon	27-Dec-04
Mexico	Point, area, nonroad and mobile	1999	SMOKE IDA	Early 2002	Hampden Kuhns, Desert Research Institute	Jeff Vukovich, UNC-CEP	1999 specific; updated Mexican inventory available from ERG soon?	27-Dec-04
Canada	Area, nonroad and mobile	2000	SMOKE IDA	Jan 12, 2005	ftp://ftp.epa.gov/pub/EmisInventory/canada_2000inventory/. USEPA via Env. Canada	UNC-CEP	New inventory; not well tested in AQ modeling applications.	12-Jan-05
Gulf of Mexico	Point, area and nonroad	2000	MS Access	18-Oct-04	MMS website: http://www.gomr.mms.gov/homepg/regulate/environ/airquality/gulfwide_emission_inventory/2000GulfwideEmissionInventory.html	Jim MacKay and Ron Thomas, TCEQ and Richard Billings, ERG	2000 specific; platform inventory is based on average August day	27-Dec-04
MARAMA	Area, nonroad and point	2002	SMOKE IDA	Last updated Feb 15, 2005	http://www.marama.org/visibility/Inventory%20Summary/2002EmissionsInventory.htm	MARAMA website/ EH Pechan	Unknown since updated recently.	15-Feb-05

Table 29. Listing of Supplemental Data Files

Bytes	Date created	Time created	File Name
506780	12/6/2004	13:41:58	task4b/CN/arinv.ca95_v3_nrd+stat+onrd.ida.gz
991	12/6/2004	13:41:08	task4b/CN/summaries/a.county.can95.rpt.gz
7201	12/6/2004	13:41:08	task4b/CN/summaries/a.scc.can95.rpt.gz
878	12/6/2004	13:41:08	task4b/CN/summaries/a.state.can95.rpt.gz
34248	12/6/2004	13:41:08	task4b/CN/summaries/a.state_scc.can95.rpt.gz
125146	12/17/2004	18:47:50	task4b/MMS/ge_dat/agpro.nonplatform.US36_148X112.txt.gz
143	12/17/2004	18:47:51	task4b/MMS/ge_dat/amgref.m3.nonplatform.goads.txt.gz
540	12/17/2004	18:47:51	task4b/MMS/ge_dat/amptpro.m3.goads.txt.gz
261	12/17/2004	18:47:51	task4b/MMS/ge_dat/amptref.m3.goads.txt.gz
90692	12/17/2004	18:47:51	task4b/MMS/ge_dat/costcy.goads.txt.gz
1125	12/17/2004	18:48:46	task4b/MMS/ge_dat/GRIDDESC
20783	12/17/2004	18:47:51	task4b/MMS/ge_dat/gspro.cmaq.cb4p25.txt.gz
329	12/17/2004	18:47:51	task4b/MMS/ge_dat/gsref.goads.cmaq.cb4p25.txt.gz
122488	12/17/2004	18:47:52	task4b/MMS/ge_dat/scc_desc.goads.txt.gz
449	12/20/2004	15:47:12	task4b/MMS/non-platform/arinv.goads.lst
156569	12/20/2004	15:47:12	task4b/MMS/non-platform/CO.nonplatform_2000EI.ida.sort.gz
172086	12/20/2004	15:47:13	task4b/MMS/non-platform/NOX.nonplatform_2000EI.ida.sort.gz
200071	12/20/2004	15:47:13	task4b/MMS/non-platform/PM.nonplatform_2000EI.ida.sort.gz
160729	12/20/2004	15:47:13	task4b/MMS/non-platform/SO2.nonplatform_2000EI.ida.sort.gz
258715	12/20/2004	15:47:39	task4b/MMS/non-platform/summaries/a.county.goads.rpt.gz
1101	12/20/2004	15:47:40	task4b/MMS/non-platform/summaries/a.scc.goads.rpt.gz
2245	12/20/2004	15:47:40	task4b/MMS/non-platform/summaries/a.state.goads.rpt.gz
13071	12/20/2004	15:47:40	task4b/MMS/non-platform/summaries/a.state_scc.goads.rpt.gz
1123	12/20/2004	15:47:40	task4b/MMS/non-platform/summaries/ag.scc.us36.goads.rpt.gz
2267	12/20/2004	15:47:40	task4b/MMS/non-platform/summaries/ag.state.us36.goads.rpt.gz
13095	12/20/2004	15:47:40	task4b/MMS/non-platform/summaries/ag.state_scc.us36.goads.rpt.gz
476760	12/20/2004	15:47:40	task4b/MMS/non-platform/summaries/ag.us36.goads.ncf
201639	12/20/2004	15:47:14	task4b/MMS/non-platform/VOC.nonplatform_2000EI.ida.sort.gz
120226	12/20/2004	15:46:35	task4b/MMS/platform/CO.afs.gwei2000.20000801.latlong.ida.gz
122429	12/20/2004	15:46:35	task4b/MMS/platform/NOX.afs.gwei2000.20000801.latlong.ida.gz
100504	12/20/2004	15:46:36	task4b/MMS/platform/PM10.afs.gwei2000.20000801.latlong.ida.gz
99235	12/20/2004	15:46:36	task4b/MMS/platform/PM2_5.afs.gwei2000.20000801.latlong.ida.gz
584	12/20/2004	15:46:37	task4b/MMS/platform/ptinv.goads.lst
1052	12/20/2004	15:46:37	task4b/MMS/platform/SO2.afs.gwei2000.20000801.latlong.ida.gz
891	12/20/2004	15:47:56	task4b/MMS/platform/summaries/p.county.goads.rpt
9566	12/20/2004	15:47:56	task4b/MMS/platform/summaries/p.scc.goads.rpt
811	12/20/2004	15:47:57	task4b/MMS/platform/summaries/p.state.goads.rpt
10358	12/20/2004	15:47:57	task4b/MMS/platform/summaries/p.state_scc.goads.rpt

Table 29 (continued)

Bytes	Date created	Time created	File Name
500856	12/20/2004	15:46:39	task4b/MMS/platform/VOC.afs.gwei2000.20000801.latlong.ida.gz
12093	12/20/2004	16:11:18	task4b/MMS/README.04dec20.mms
281244	12/6/2004	13:43:49	task4b/MX/arinv.mx.ver7.txt.gz
412	12/6/2004	13:44:42	task4b/MX/pstk.mx.m3.txt.gz
8219	12/6/2004	13:44:14	task4b/MX/ptinv_mx_dat.txt.dos.gz
19497	12/6/2004	13:45:45	task4b/MX/summaries/a.county.mexico.rpt.gz
3313	12/6/2004	13:45:45	task4b/MX/summaries/a.scc.mexico.rpt.gz
750	12/6/2004	13:45:46	task4b/MX/summaries/a.state.mexico.rpt.gz
11251	12/6/2004	13:45:46	task4b/MX/summaries/a.state_scc.mexico.rpt.gz
1896	12/6/2004	13:45:53	task4b/MX/summaries/p.county.mexico.rpt.gz
1136	12/6/2004	13:45:53	task4b/MX/summaries/p.scc.mexico.rpt.gz
793	12/6/2004	13:45:53	task4b/MX/summaries/p.state.mexico.rpt.gz
2595	12/6/2004	13:45:53	task4b/MX/summaries/p.state_scc.mexico.rpt.gz
1543109	12/1/2004	16:06:30	task4b/VISTAS/ida_ar_2002_24mar04.emis.onlyVISTAS.cep.gz
5653943	12/1/2004	16:06:30	task4b/VISTAS/ida_nr_2002_23mar04.emis.onlyVISTAS.cep.gz
2963335	12/1/2004	16:06:31	task4b/VISTAS/ptinv_vistas_2002_041504.ida.onlyVISTAS.cep.gz
36041	12/1/2004	15:34:56	task4b/VISTAS/summaries/a.county.onlyvistas.rpt.gz
6836	12/1/2004	15:34:56	task4b/VISTAS/summaries/a.scc.onlyvistas.rpt.gz
773	12/1/2004	15:34:56	task4b/VISTAS/summaries/a.state.onlyvistas.rpt.gz
38118	12/1/2004	15:34:56	task4b/VISTAS/summaries/a.state_scc.onlyvistas.rpt.gz
38973	12/1/2004	15:47:05	task4b/VISTAS/summaries/n.county.onlyvistas.rpt.gz
11112	12/1/2004	15:47:05	task4b/VISTAS/summaries/n.scc.onlyvistas.rpt.gz
766	12/1/2004	15:47:05	task4b/VISTAS/summaries/n.state.onlyvistas.rpt.gz
92264	12/1/2004	15:47:05	task4b/VISTAS/summaries/n.state_scc.onlyvistas.rpt.gz
30334	12/1/2004	15:23:06	task4b/VISTAS/summaries/p.county.onlyvistas.rpt.gz
95552	12/1/2004	15:23:06	task4b/VISTAS/summaries/p.scc.onlyvistas.rpt.gz
739	12/1/2004	15:23:06	task4b/VISTAS/summaries/p.state.onlyvistas.rpt.gz
265922	12/1/2004	15:23:06	task4b/VISTAS/summaries/p.state_scc.onlyvistas.rpt.gz
493742	12/2/2004	17:27:40	task4b/WRAP/area/arinv.WRAP2002_v3_ida.txt.onlyWRAP.cep.gz
564251	12/2/2004	17:26:16	task4b/WRAP/nonroad/nrinv.Environ_WRAP_aut03_v2_ida.txt.gz
564198	12/2/2004	17:26:17	task4b/WRAP/nonroad/nrinv.Environ_WRAP_spr03_v2_ida.txt.gz
579653	12/2/2004	17:26:19	task4b/WRAP/nonroad/nrinv.Environ_WRAP_sum03_v2_ida.txt.gz
539663	12/2/2004	17:26:21	task4b/WRAP/nonroad/nrinv.Environ_WRAP_win03_v2_ida.txt.gz
5111	12/2/2004	17:26:22	task4b/WRAP/nonroad/nrinv.WRAP_shipping03_v1_ida.txt.gz
3135152	12/2/2004	17:26:52	task4b/WRAP/point/ptinv.WRAP2002_v1_WRAPonly_ida.txt.gz
21717	12/2/2004	11:10:58	task4b/WRAP/summaries/a.county.onlywrap.rpt.gz
8872	12/2/2004	11:10:58	task4b/WRAP/summaries/a.scc.onlywrap.rpt.gz
887	12/2/2004	11:10:58	task4b/WRAP/summaries/a.state.onlywrap.rpt.gz
28653	12/2/2004	11:10:58	task4b/WRAP/summaries/a.state_scc.onlywrap.rpt.gz
24690	12/2/2004	17:17:02	task4b/WRAP/summaries/n.county.aut_wrap.rpt.gz
2768	12/2/2004	17:19:44	task4b/WRAP/summaries/n.county.shp_wrap.rpt.gz
24725	12/2/2004	17:13:30	task4b/WRAP/summaries/n.county.spr_wrap.rpt.gz
25009	12/2/2004	17:15:16	task4b/WRAP/summaries/n.county.sum_wrap.rpt.gz
24516	12/2/2004	17:10:29	task4b/WRAP/summaries/n.county.win_wrap.rpt.gz
1900	12/2/2004	17:17:02	task4b/WRAP/summaries/n.scc.aut_wrap.rpt.gz
462	12/2/2004	17:19:44	task4b/WRAP/summaries/n.scc.shp_wrap.rpt.gz
1922	12/2/2004	17:13:30	task4b/WRAP/summaries/n.scc.spr_wrap.rpt.gz
1909	12/2/2004	17:15:16	task4b/WRAP/summaries/n.scc.sum_wrap.rpt.gz
1893	12/2/2004	17:10:29	task4b/WRAP/summaries/n.scc.win_wrap.rpt.gz
952	12/2/2004	17:17:02	task4b/WRAP/summaries/n.state.aut_wrap.rpt.gz
453	12/2/2004	17:19:44	task4b/WRAP/summaries/n.state.shp_wrap.rpt.gz
964	12/2/2004	17:13:30	task4b/WRAP/summaries/n.state.spr_wrap.rpt.gz
956	12/2/2004	17:15:16	task4b/WRAP/summaries/n.state.sum_wrap.rpt.gz
958	12/2/2004	17:10:29	task4b/WRAP/summaries/n.state.win_wrap.rpt.gz

Table 29 (continued)

Bytes	Date created	Time created	File Name
12790	12/2/2004	17:17:02	task4b/WRAP/summaries/n.state_scc.aut_wrap.rpt.gz
706	12/2/2004	17:19:44	task4b/WRAP/summaries/n.state_scc.shp_wrap.rpt.gz
12857	12/2/2004	17:13:30	task4b/WRAP/summaries/n.state_scc.spr_wrap.rpt.gz
12913	12/2/2004	17:15:16	task4b/WRAP/summaries/n.state_scc.sum_wrap.rpt.gz
12480	12/2/2004	17:10:29	task4b/WRAP/summaries/n.state_scc.win_wrap.rpt.gz
15361	12/2/2004	11:03:55	task4b/WRAP/summaries/p.county.onlywrap.rpt.gz
70477	12/2/2004	11:03:55	task4b/WRAP/summaries/p.scc.onlywrap.rpt.gz
879	12/2/2004	11:03:55	task4b/WRAP/summaries/p.state.onlywrap.rpt.gz
161640	12/2/2004	11:03:55	task4b/WRAP/summaries/p.state_scc.onlywrap.rpt.gz

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APPENDIX A

SUMMARIES OF ANNUAL EMISSIONS BY SOURCE CATEGORY, SECTOR, AND POLLUTANT

Table A-1. Summary of Annual VOC Emissions for the CENRAP Region by Category, Sector, and Pollutant

Category	Category Number	Sector	VOC		
			Tons/Year	Percent of Total	Cumulative Percent
Mobile Sources-Highway Vehicles-Gasoline	2201	ON-ROAD	765,838	17.47	17.47
Industrial Processes-Oil and Gas Production: SIC 13	2310	AREA	731,153	16.68	34.15
Mobile Sources-Pleasure Craft	2282	NONROAD	418,585	9.55	43.7
Mobile Sources-Off-highway Vehicle Gasoline, 2-Stroke	2260	NONROAD	208,980	4.77	48.47
Petroleum and Petroleum Product Storage & Transport-Other	250	AREA	189,313	4.32	52.79
Solvent Utilization-Miscellaneous Non-industrial: Consumer and Commercial	24600 - 24	AREA	167,832	3.83	56.62
Industrial Surface Coating	2401015000	AREA	153,472	3.5	60.12
Stationary Source Fuel Combustion-Residential	2104	AREA	143,710	3.28	63.4
Solvent Utilization-Miscellaneous Non-industrial: Commercial	24610 - 24	AREA	128,915	2.94	66.34
Miscellaneous Area Sources-Agricultural Production-Crops-Field Burning	28015	AREA	102,575	2.34	68.68
Petroleum and Solvent Evaporation-Surface Coating Operations	402	POINT	101,968	2.33	71.01
Industrial Processes-Pulp and Paper and Wood Products	307	POINT	95,121	2.17	73.18
Mobile Sources-Off-highway Vehicle Gasoline, 4-Stroke	2265	NONROAD	87,696	2	75.18
Architectural Coatings	2401001000	AREA	78,767	1.8	76.98
Gas Marketing Stage II	25010601	AREA	74,667	1.7	78.68
Miscellaneous Area Sources-Other Combustion	2810	POINT	69,037	1.57	80.25
Miscellaneous Area Sources-Other Combustion	2810	AREA	68,527	1.56	81.81
Industrial Processes-Chemical Manufacturing	301	POINT	68,030	1.55	83.36
Industrial Processes-Petroleum Industry	306	POINT	65,784	1.5	84.86
Degreasing	2415	AREA	58,013	1.32	86.18
Mobile Sources-Off-highway Vehicle Diesel	2270	NONROAD	48,208	1.1	87.28
Solvent Utilization-Miscellaneous Non-industrial: Consumer	2465	AREA	45,775	1.04	88.32
Open Burning-Waste Disposal, Treatment, and Recovery	261	AREA	40,923	0.93	89.25
Gas Marketing Stage I	25010600	AREA	39,759	0.91	90.16
Petroleum and Solvent Evaporation-Petroleum Product Storage at Refineries	403	POINT	29,257	0.67	90.83
Mobile Sources-Highway Vehicles-Diesel	2230	ON-ROAD	26,471	0.6	91.43
Industrial Processes-Oil and Gas Production	310	POINT	25,917	0.59	92.02
Internal Combustion Engines-Industrial	2020	POINT	25,671	0.59	92.61
Graphic Arts	2425	AREA	21,610	0.49	93.1
Miscellaneous Area Sources-Prescribed Rangeland Burning	2810020	AREA	21,313	0.49	93.59
Industrial Processes-Food and Agriculture	302	POINT	19,039	0.43	94.02
Solvent Utilization-Dry Cleaning	2420	AREA	18,967	0.43	94.45
Solvent Utilization-Miscellaneous Industrial	2440020000	AREA	17,119	0.39	94.84
Mobile Sources-Railroad Equipment	2285	NONROAD	16,523	0.38	95.22
Petroleum and Solvent Evaporation-Petroleum Liquids Storage (non-Refinery)	4040	POINT	15,417	0.35	95.57
Auto Refinishing	2401005000	AREA	12,277	0.28	95.85
External Combustion Boilers-Electric Generation	1010	POINT	11,693	0.27	96.12
Mobile Sources-LPG	2267	NONROAD	11,266	0.26	96.38
Waste Disposal, Treatment, and Recovery-Wastewater Treatment	2630	AREA	9,790	0.22	96.60
Industrial Processes-Rubber and Miscellaneous Plastics Products	308	POINT	8,855	0.2	96.80
Traffic Markings	2401008000	AREA	8,694	0.2	97.00
External Combustion Boilers-Industrial	1020	POINT	8,680	0.2	97.20
Industrial Processes-Mineral Products	305	POINT	8,366	0.19	97.39
Petroleum and Solvent Evaporation-Organic Solvent Evaporation	401	POINT	8,203	0.19	97.58
Petroleum and Solvent Evaporation-Transportation and Marketing of Petroleum Products	406	POINT	8,167	0.19	97.77

Category	Category Number	Sector	VOC		
			Tons/Year	Percent of Total	Cumulative Percent
Industrial Processes-Miscellaneous Manufacturing Industries	399	POINT	7,998	0.18	97.95
Petroleum and Solvent Evaporation-Printing/Publishing	405	POINT	7,394	0.17	98.12
Mobile Sources-CNG	2268	NONROAD	6,458	0.15	98.27
Miscellaneous Area Sources-Agricultural Production-Crops	2801	AREA	6,215	0.14	98.41
Industrial Processes-Secondary Metal Production	304	POINT	5,912	0.13	98.54
Stationary Source Fuel Combustion-Industrial	2102	AREA	5,408	0.12	98.66
Waste Disposal, Treatment, and Recovery-Landfills	2620	AREA	5,347	0.12	98.78
Mobile Sources-Aircraft	2275	NONROAD	5,337	0.12	98.90
Industrial Processes-Cooling Tower	3850	POINT	4,751	0.11	99.01
Rubber/Plastics	2430000000	AREA	4,256	0.1	99.11
Industrial Processes-Food and Kindred Products: SIC 20	2302	AREA	3,605	0.08	99.19
Mobile Sources-Marine Vessels, Commercial	2280	NONROAD	3,120	0.07	99.26
Petroleum and Solvent Evaporation-Organic Chemical Storage	407	POINT	2,996	0.07	99.33
Industrial Processes-Primary Metal Production	303	POINT	2,625	0.06	99.39
Internal Combustion Engines-Commercial/Institutional	2030	POINT	2,349	0.05	99.44
Industrial Processes-Industrial Processes: NEC	2399	AREA	2,097	0.05	99.49
Waste Disposal-Solid Waste Disposal-Government	501	POINT	2,076	0.05	99.54
Stationary Source Fuel Combustion-Commercial/Institutional	2103	AREA	1,684	0.04	99.58
Waste Disposal, Treatment, and Recovery-TSDFs	2640	AREA	1,678	0.04	99.62
Internal Combustion Engines-Electric Generation	2010	POINT	1,576	0.04	99.66
Petroleum and Solvent Evaporation-Organic Chemical Transportation	4089	POINT	1,531	0.03	99.69
Industrial Processes-Fabricated Metal Products	309	POINT	1,528	0.03	99.72
Miscellaneous Area Sources-Catastrophic/Accidental Releases	2830	AREA	1,254	0.03	99.75
Waste Disposal-Solid Waste Disposal-Industrial	503	POINT	1,146	0.03	99.78
Solvent Utilization-Miscellaneous Non-industrial: Consumer	2465000000	AREA	1,009	0.02	99.80
Industrial Processes-In-process Fuel Use	390	POINT	742	0.02	99.82
External Combustion Boilers-Commercial/Institutional	1030	POINT	682	0.02	99.84
Waste Disposal, Treatment, and Recovery-On-site Incineration	2601	AREA	650	0.01	99.85
Waste Disposal-Solid Waste Disposal-Commercial/Institutional	502	POINT	606	0.01	99.86
Mobile Sources-Aircraft	2275	POINT	599	0.01	99.87
Industrial Processes-Textile Products	330	POINT	567	0.01	99.88
Internal Combustion Engines-Fugitive Emissions	2888	POINT	508	0.01	99.89
Industrial Processes-Electrical Equipment	313	POINT	502	0.01	99.90
Internal Combustion Engines-Engine Testing	2040	POINT	455	0.01	99.91
Industrial Processes-Machinery, Miscellaneous	3129	POINT	455	0.01	99.92
Waste Disposal, Treatment, and Recovery-Leaking Underground Storage Tanks	2660	AREA	450	0.01	99.93
Industrial Processes-Transportation Equipment	314	POINT	378	0.01	99.94
Mobile Sources-Aircraft	2275	AREA	285	0.01	99.95
Mobile Sources-Off-highway Vehicle Gasoline, 4-Stroke	2265	POINT	283	0.01	99.96
MACT Source Categories : Vinyl-based Resins	6463	POINT	256	0.01	99.97
MACT Source Categories : Cellulose-based Resins	644	POINT	221	0.01	99.98
External Combustion Boilers-Space Heaters	1050	POINT	207	0	99.98
Industrial Processes-Leather and Leather Products	3209	POINT	130	0.00	99.98
Bulk Materials Transport & Transport	253	AREA	108	0.00	99.99
Petroleum and Solvent Evaporation-	4250	POINT	101	0.00	99.99
Miscellaneous Area Sources-Prescribed Rangeland Burning	2810020	POINT	79	0.00	99.99
Petroleum and Solvent Evaporation : Dry Cleaning	410	POINT	67	0.00	99.99
Waste Disposal, Treatment, and Recovery-Landfills	2620	POINT	51	0.00	99.99
Miscellaneous Area Sources-Aircraft/Rocket Engine Firing and Testing	2810040	AREA	45	0.00	99.99
Petroleum and Solvent Evaporation : Organic Chemical Transportation	4088	POINT	39	0.00	99.99

Category	Category Number	Sector	VOC		
			Tons/Year	Percent of Total	Cumulative Percent
Waste Disposal-Site Remediation	504	POINT	35	0.00	100.0
Industrial Processes-Photo Equip/Health Care/Labs/Air Condit/SwimPools	3150	POINT	20	0.00	100.0
Mobile Sources-Off-highway Vehicle Diesel	2270	POINT	16	0.00	100.0
MACT Source Categories : Styrene or Methacrylate Based Resins	6413	POINT	16	0.00	100.0
MACT Source Categories-Miscellaneous Resins	6452	POINT	12	0.00	100.0
Industrial Processes-Building Construction	3110	POINT	11	0.00	100.0
MACT Source Categories : Agricultural Chemicals Production	631	POINT	3.1	0.00	100.0
MACT Source Categories-Inorganic Chemicals Manufacturing	6513	POINT	2.1	0.00	100.0
MACT Source Categories-Miscellaneous Processes (Chemicals)	6848	POINT	1.0	0.00	100.0
MACT Source Categories : Food and Agricultural Processes	6258	POINT	0.7	0.00	100.0
Miscellaneous Area Sources-Agricultural Production-Crops	2801	POINT	0.5	0.00	100.0
MACT Source Categories-Miscellaneous Processes	6828	POINT	0.0	0.00	100.0
Mobile Sources-Unpaved Roads	2296	POINT		0.00	100.0
Mobile Sources-Paved Roads	2294	POINT		0	100.0
MACT Source Categories-Miscellaneous Processes	6824	POINT		0	100.0
Mobile Sources-Unpaved Roads	2296	AREA		0	100.0
Industrial Processes-Construction: SIC 15-17	2311	AREA		0	100.0
Mobile Sources-Paved Roads	2294	AREA		0	100.0
Industrial Processes-Mining and Quarrying: SIC 14	2325	AREA		0	100.0
Miscellaneous Area Sources-Agricultural Production-Crops-Tilling & Harvesting	28010	AREA		0	100.0
Industrial Processes-Printing and Publishing	3600	POINT		0	100.0
MACT Source Categories : Consumer Product Manufacturing Facilities	6818	POINT		0	100.0
Internal Combustion Engines-Off-highway Diesel Engines	2700	POINT		0	100.0
Miscellaneous Area Sources-Agriculture Production-Livestock-Cattle and Calves Waste Emissions	280502	AREA		0	100.0
Miscellaneous Area Sources-Agriculture Production-Livestock-Swine	2805025	AREA		0	100.0
Miscellaneous Area Sources-Agriculture Production-Livestock-Poultry	2805030	AREA		0	100.0
Miscellaneous Area Sources-Agriculture Production-Livestock-Beef Cattle	280500	AREA		0	100.0
Miscellaneous Area Sources-Domestic Animals Waste Emissions	2806	AREA		0	100.0
Miscellaneous Area Sources-Agriculture Production-Livestock-Dairy Cattle	280501	AREA		0	100.0
Miscellaneous Area Sources-Wild Animals Waste Emissions	2807	AREA		0	100.0
Miscellaneous Area Sources-Agriculture Production-Livestock-Horses and Ponies	2805035	AREA		0	100.0
Miscellaneous Area Sources-Agriculture Production-Livestock-Goats	2805045	AREA		0	100.0
Mobile Sources-Highway Vehicles-Gasoline	2201	AREA		0	100.0
Miscellaneous Area Sources-Agriculture Production-Livestock-Sheep and Lambs	2805040	AREA		0	100.0
Mobile Sources-Highway Vehicles-Diesel	2230	AREA		0	100.0
Inorganic Chemical Storage & Transport	252	AREA		0	100.0
Stationary Source Fuel Combustion-Electric Utility	2101	AREA		0	100.0
Totals for All Categories			4,383,876	100	

Table A-2. Summary of Annual NOx Emissions for the CENRAP Region by Category, Sector, and Pollutant

Category	Category Number	Sector	NOx		
			Tons/Year	Percent of Total	Cumulative Percent
External Combustion Boilers-Electric Generation	1010	POINT	895,606	17.38	17.38
Mobile Sources-Highway Vehicles-Diesel	2230	ON-ROAD	746,948	14.5	31.88
Mobile Sources-Highway Vehicles-Gasoline	2201	ON-ROAD	736,720	14.3	46.18
Industrial Processes-Oil and Gas Production: SIC 13	2310	AREA	476,029	9.24	55.42
Mobile Sources-Off-highway Vehicle Diesel	2270	NONROAD	407,557	7.91	63.33
Internal Combustion Engines-Industrial	2020	POINT	380,352	7.38	70.71
Mobile Sources-Railroad Equipment	2285	NONROAD	331,556	6.44	77.15
Stationary Source Fuel Combustion-Industrial	2102	AREA	194,842	3.78	80.93
External Combustion Boilers-Industrial	1020	POINT	184,597	3.58	84.51
Mobile Sources-Marine Vessels, Commercial	2280	NONROAD	123,773	2.4	86.91
Industrial Processes-Mineral Products	305	POINT	91,544	1.78	88.69
Industrial Processes-Petroleum Industry	306	POINT	69,805	1.35	90.04
Industrial Processes-Chemical Manufacturing	301	POINT	60,933	1.18	91.22
Miscellaneous Area Sources-Agricultural Production-Crops-Field Burning	28015	AREA	54,497	1.06	92.28
Stationary Source Fuel Combustion-Residential	2104	AREA	50,950	0.99	93.27
Mobile Sources-LPG	2267	NONROAD	42,269	0.82	94.09
Stationary Source Fuel Combustion-Commercial/Institutional	2103	AREA	33,852	0.66	94.75
Internal Combustion Engines-Electric Generation	2010	POINT	33,598	0.65	95.4
Industrial Processes-In-process Fuel Use	390	POINT	31,703	0.62	96.02
Mobile Sources-Pleasure Craft	2282	NONROAD	30,029	0.58	96.6
Mobile Sources-Off-highway Vehicle Gasoline, 4-Stroke	2265	NONROAD	22,128	0.43	97.03
Industrial Processes-Oil and Gas Production	310	POINT	16,082	0.31	97.34
Mobile Sources-Aircraft	2275	NONROAD	15,299	0.3	97.64
Miscellaneous Area Sources-Other Combustion	2810	AREA	14,089	0.27	97.91
Industrial Processes-Primary Metal Production	303	POINT	13,450	0.26	98.17
Industrial Processes-Pulp and Paper and Wood Products	307	POINT	11,920	0.23	98.4
Open Burning-Waste Disposal, Treatment, and Recovery	261	AREA	10,482	0.2	98.6
Miscellaneous Area Sources-Other Combustion	2810	POINT	8,248	0.16	98.76
Internal Combustion Engines-Commercial/Institutional	2030	POINT	7,898	0.15	98.91
External Combustion Boilers-Commercial/Institutional	1030	POINT	7,260	0.14	99.05
Mobile Sources-CNG	2268	NONROAD	6,468	0.13	99.18
Petroleum and Petroleum Product Storage & Transport-Other	250	AREA	4,941	0.1	99.28
Industrial Processes-Secondary Metal Production	304	POINT	3,897	0.08	99.36
Waste Disposal-Solid Waste Disposal-Government	501	POINT	3,717	0.07	99.43
Industrial Processes-Miscellaneous Manufacturing Industries	399	POINT	3,697	0.07	99.5
Miscellaneous Area Sources-Prescribed Rangeland Burning	2810020	AREA	3,563	0.07	99.57
Mobile Sources-Off-highway Vehicle Gasoline, 2-Stroke	2260	NONROAD	2,981	0.06	99.63
Miscellaneous Area Sources-Agricultural Production-Crops	2801	AREA	2,758	0.05	99.68
Bulk Materials Transport & Transport	253	AREA	2,354	0.05	99.73
Industrial Processes-Food and Agriculture	302	POINT	2,267	0.04	99.77
Mobile Sources-Aircraft	2275	POINT	1,825	0.04	99.81
Industrial Processes-Rubber and Miscellaneous Plastics Products	308	POINT	1,725	0.03	99.84
Waste Disposal, Treatment, and Recovery-On-site Incineration	2601	AREA	1,289	0.03	99.87
Waste Disposal-Solid Waste Disposal-Industrial	503	POINT	1,227	0.02	99.89
Internal Combustion Engines-Engine Testing	2040	POINT	868	0.02	99.91
Petroleum and Solvent Evaporation-Surface Coating Operations	402	POINT	627	0.01	99.92
Industrial Processes-Industrial Processes: NEC	2399	AREA	616	0.01	99.93

Category	Category Number	Sector	NOx		
			Tons/Year	Percent of Total	Cumulative Percent
External Combustion Boilers-Space Heaters	1050	POINT	586	0.01	99.94
Waste Disposal-Site Remediation	504	POINT	535	0.01	99.95
Industrial Processes-Fabricated Metal Products	309	POINT	480	0.01	99.96
Miscellaneous Area Sources-Aircraft/Rocket Engine Firing and Testing	2810040	AREA	219	0.00	99.96
Waste Disposal-Solid Waste Disposal-Commercial/Institutional	502	POINT	209	0.00	99.96
Mobile Sources-Off-highway Vehicle Diesel	2270	POINT	208	0.00	99.96
Mobile Sources-Off-highway Vehicle Gasoline, 4-Stroke	2265	POINT	188	0.00	99.96
Petroleum and Solvent Evaporation-Organic Solvent Evaporation	401	POINT	187	0.00	99.96
Miscellaneous Area Sources-Prescribed Rangeland Burning	2810020	POINT	157	0.00	99.96
Petroleum and Solvent Evaporation-Transportation and Marketing of Petroleum Products	406	POINT	111	0.00	99.96
Petroleum and Solvent Evaporation-Petroleum Liquids Storage (non-Refinery)	4040	POINT	97	0.00	99.96
Petroleum and Solvent Evaporation-Printing/Publishing	405	POINT	90	0.00	99.96
Industrial Processes-Electrical Equipment	313	POINT	82	0.00	99.96
Industrial Processes-Machinery, Miscellaneous	3129	POINT	68	0.00	99.96
Petroleum and Solvent Evaporation-Petroleum Product Storage at Refineries	403	POINT	48	0.00	99.96
Internal Combustion Engines-Fugitive Emissions	2888	POINT	26	0.00	99.96
Petroleum and Solvent Evaporation-Organic Chemical Transportation	4089	POINT	18	0.00	99.96
MACT Source Categories : Vinyl-based Resins	6463	POINT	11	0.00	99.96
Solvent Utilization-Miscellaneous Non-industrial: Commercial	24610 - 24	AREA	10	0.00	99.96
Petroleum and Solvent Evaporation-	4250	POINT	6	0.00	99.96
Industrial Processes-Transportation Equipment	314	POINT	5	0.00	99.96
Internal Combustion Engines-Off-highway Diesel Engines	2700	POINT	4	0.00	99.96
Petroleum and Solvent Evaporation-Organic Chemical Storage	407	POINT	4	0.00	99.96
Industrial Processes-Textile Products	330	POINT	3	0.00	99.96
Miscellaneous Area Sources-Agricultural Production-Crops	2801	POINT	2	0.00	99.96
Industrial Processes-Building Construction	3110	POINT	1	0.00	99.96
MACT Source Categories : Cellulose-based Resins	644	POINT	0	0.00	99.96
Industrial Processes-Cooling Tower	3850	POINT	0	0.00	99.96
Industrial Processes-Photo Equip/Health Care/Labs/Air Condit/SwimPools	3150	POINT	0	0.00	99.96
MACT Source Categories-Inorganic Chemicals Manufacturing	6513	POINT	0	0.00	100.0
Waste Disposal, Treatment, and Recovery-Landfills	2620	POINT		0	100.0
Petroleum and Solvent Evaporation : Organic Chemical Transportation	4088	POINT		0	100.0
MACT Source Categories-Miscellaneous Processes (Chemicals)	6848	POINT		0	100.0
Mobile Sources-Unpaved Roads	2296	POINT		0	100.0
Mobile Sources-Paved Roads	2294	POINT		0	100.0
Solvent Utilization-Miscellaneous Non-industrial: Consumer and Commercial	24600 - 24	AREA		0	100.0
Industrial Surface Coating	2401015000	AREA		0	100.0
Architectural Coatings	2401001000	AREA		0	100.0
Gas Marketing Stage II	25010601	AREA		0	100.0
Degreasing	2415	AREA		0	100.0
Solvent Utilization-Miscellaneous Non-industrial: Consumer	2465	AREA		0	100.0
Gas Marketing Stage I	25010600	AREA		0	100.0
Graphic Arts	2425	AREA		0	100.0
Solvent Utilization-Dry Cleaning	2420	AREA		0	100.0

Category	Category Number	Sector	NOx		
			Tons/Year	Percent of Total	Cumulative Percent
Solvent Utilization-Miscellaneous Industrial	2440020000	AREA		0	100.0
Auto Refinishing	2401005000	AREA		0	100.0
Waste Disposal, Treatment, and Recovery-Wastewater Treatment	2630	AREA		0	100.0
Traffic Markings	2401008000	AREA		0	100.0
Waste Disposal, Treatment, and Recovery-Landfills	2620	AREA		0	100.0
Rubber/Plastics	2430000000	AREA		0	100.0
Industrial Processes-Food and Kindred Products: SIC 20	2302	AREA		0	100.0
Waste Disposal, Treatment, and Recovery-TSDFs	2640	AREA		0	100.0
Miscellaneous Area Sources-Catastrophic/Accidental Releases	2830	AREA		0	100.0
Solvent Utilization-Miscellaneous Non-industrial: Consumer	2465000000	AREA		0	100.0
Waste Disposal, Treatment, and Recovery-Leaking Underground Storage Tanks	2660	AREA		0	100.0
Mobile Sources-Aircraft	2275	AREA		0	100.0
Industrial Processes-Leather and Leather Products	3209	POINT		0	100.0
Petroleum and Solvent Evaporation : Dry Cleaning	410	POINT		0	100.0
MACT Source Categories : Styrene or Methacrylate Based Resins	6413	POINT		0	100.0
MACT Source Categories-Miscellaneous Resins	6452	POINT		0	100.0
MACT Source Categories : Agricultural Chemicals Production	631	POINT		0	100.0
MACT Source Categories : Food and Agricultural Processes	6258	POINT		0	100.0
MACT Source Categories-Miscellaneous Processes	6828	POINT		0	100.0
MACT Source Categories-Miscellaneous Processes	6824	POINT		0	100.0
Mobile Sources-Unpaved Roads	2296	AREA		0	100.0
Industrial Processes-Construction: SIC 15-17	2311	AREA		0	100.0
Mobile Sources-Paved Roads	2294	AREA		0	100.0
Industrial Processes-Mining and Quarrying: SIC 14	2325	AREA		0	100.0
Miscellaneous Area Sources-Agricultural Production-Crops-Tilling & Harvesting	28010	AREA		0	100.0
Industrial Processes-Printing and Publishing	3600	POINT		0	100.0
MACT Source Categories : Consumer Product Manufacturing Facilities	6818	POINT		0	100.0
Miscellaneous Area Sources-Agriculture Production-Livestock-Cattle and Calves Waste Emissions	280502	AREA		0	100.0
Miscellaneous Area Sources-Agriculture Production-Livestock-Swine	2805025	AREA		0	100.0
Miscellaneous Area Sources-Agriculture Production-Livestock-Poultry	2805030	AREA		0	100.0
Miscellaneous Area Sources-Agriculture Production-Livestock-Beef Cattle	280500	AREA		0	100.0
Miscellaneous Area Sources-Domestic Animals Waste Emissions	2806	AREA		0	100.0
Miscellaneous Area Sources-Agriculture Production-Livestock-Dairy Cattle	280501	AREA		0	100.0
Miscellaneous Area Sources-Wild Animals Waste Emissions	2807	AREA		0	100.0
Miscellaneous Area Sources-Agriculture Production-Livestock-Horses and Ponies	2805035	AREA		0	100.0
Miscellaneous Area Sources-Agriculture Production-Livestock-Goats	2805045	AREA		0	100.0
Mobile Sources-Highway Vehicles-Gasoline	2201	AREA		0	100.0
Miscellaneous Area Sources-Agriculture Production-Livestock-Sheep and Lambs	2805040	AREA		0	100.0
Mobile Sources-Highway Vehicles-Diesel	2230	AREA		0	100.0
Inorganic Chemical Storage & Transport	252	AREA		0	100.0
Stationary Source Fuel Combustion-Electric Utility	2101	AREA		0	100.0
Totals for All Categories			5,152,190	100	

Table A-3. Summary of Annual CO Emissions for the CENRAP Region by Category, Sector, and Pollutant

Category	Category Number	Sector	CO		
			Tons/Year	Percent of Total	Cumulative Percent
Mobile Sources-Highway Vehicles-Gasoline	2201	ON-ROAD	11,701,959	52.15	52.15
Mobile Sources-Off-highway Vehicle Gasoline, 4-Stroke	2265	NONROAD	2,603,360	11.6	63.75
Miscellaneous Area Sources-Agricultural Production-Crops-Field Burning	28015	AREA	1,401,805	6.25	70
Mobile Sources-Pleasure Craft	2282	NONROAD	1,325,323	5.91	75.91
Miscellaneous Area Sources-Other Combustion	2810	AREA	1,024,320	4.57	80.48
Miscellaneous Area Sources-Other Combustion	2810	POINT	815,770	3.64	84.12
Mobile Sources-Off-highway Vehicle Gasoline, 2-Stroke	2260	NONROAD	445,995	1.99	86.11
Stationary Source Fuel Combustion-Residential	2104	AREA	399,828	1.78	87.89
Miscellaneous Area Sources-Prescribed Rangeland Burning	2810020	AREA	324,217	1.44	89.33
External Combustion Boilers-Electric Generation	1010	POINT	275,840	1.23	90.56
Industrial Processes-Oil and Gas Production: SIC 13	2310	AREA	250,117	1.11	91.67
Open Burning-Waste Disposal, Treatment, and Recovery	261	AREA	247,871	1.1	92.77
Mobile Sources-Off-highway Vehicle Diesel	2270	NONROAD	247,141	1.1	93.87
Industrial Processes-Chemical Manufacturing	301	POINT	169,464	0.76	94.63
Mobile Sources-LPG	2267	NONROAD	165,799	0.74	95.37
Internal Combustion Engines-Industrial	2020	POINT	153,390	0.68	96.05
Mobile Sources-Highway Vehicles-Diesel	2230	ON-ROAD	133,025	0.59	96.64
External Combustion Boilers-Industrial	1020	POINT	121,221	0.54	97.18
Industrial Processes-Primary Metal Production	303	POINT	96,722	0.43	97.61
Industrial Processes-Mineral Products	305	POINT	63,534	0.28	97.89
Mobile Sources-Aircraft	2275	NONROAD	58,554	0.26	98.15
Miscellaneous Area Sources-Agricultural Production-Crops	2801	AREA	55,100	0.25	98.4
Industrial Processes-Petroleum Industry	306	POINT	52,513	0.23	98.63
Stationary Source Fuel Combustion-Industrial	2102	AREA	44,836	0.2	98.83
Mobile Sources-Railroad Equipment	2285	NONROAD	43,426	0.19	99.02
Industrial Processes-Pulp and Paper and Wood Products	307	POINT	39,842	0.18	99.2
Mobile Sources-CNG	2268	NONROAD	26,035	0.12	99.32
Stationary Source Fuel Combustion-Commercial/Institutional	2103	AREA	19,902	0.09	99.41
Industrial Processes-Secondary Metal Production	304	POINT	19,676	0.09	99.5
Mobile Sources-Marine Vessels, Commercial	2280	NONROAD	18,111	0.08	99.58
Industrial Processes-Food and Agriculture	302	POINT	13,602	0.06	99.64
Industrial Processes-Oil and Gas Production	310	POINT	10,021	0.04	99.68
Internal Combustion Engines-Electric Generation	2010	POINT	10,003	0.04	99.72
Mobile Sources-Aircraft	2275	POINT	9,552	0.04	99.76
Mobile Sources-Off-highway Vehicle Gasoline, 4-Stroke	2265	POINT	7,992	0.04	99.8
Industrial Processes-In-process Fuel Use	390	POINT	6,917	0.03	99.83
External Combustion Boilers-Commercial/Institutional	1030	POINT	6,566	0.03	99.86
Industrial Processes-Food and Kindred Products: SIC 20	2302	AREA	5,540	0.02	99.88
Industrial Processes-Miscellaneous Manufacturing Industries	399	POINT	4,282	0.02	99.9
Waste Disposal-Solid Waste Disposal-Government	501	POINT	4,094	0.02	99.92
Waste Disposal, Treatment, and Recovery-On-site Incineration	2601	AREA	3,687	0.02	99.94
Internal Combustion Engines-Commercial/Institutional	2030	POINT	3,660	0.02	99.96
Waste Disposal-Solid Waste Disposal-Industrial	503	POINT	1,368	0.01	99.97
Internal Combustion Engines-Engine Testing	2040	POINT	1,325	0.01	99.98
Miscellaneous Area Sources-Aircraft/Rocket Engine Firing and Testing	2810040	AREA	842	0	99.98
Waste Disposal-Solid Waste Disposal-Commercial/Institutional	502	POINT	733	0	99.98

Category	Category Number	Sector	CO		
			Tons/Year	Percent of Total	Cumulative Percent
Petroleum and Solvent Evaporation-Surface Coating Operations	402	POINT	540	0	99.98
Petroleum and Solvent Evaporation-Organic Solvent Evaporation	401	POINT	390	0	99.98
Miscellaneous Area Sources-Prescribed Rangeland Burning	2810020	POINT	340	0	99.98
Bulk Materials Transport & Transport	253	AREA	305	0	99.98
Petroleum and Solvent Evaporation-Transportation and Marketing of Petroleum Products	406	POINT	279	0	99.98
Petroleum and Solvent Evaporation-Petroleum Liquids Storage (non-Refinery)	4040	POINT	277	0	99.98
External Combustion Boilers-Space Heaters	1050	POINT	258	0	99.98
Industrial Processes-Rubber and Miscellaneous Plastics Products	308	POINT	204	0	99.98
Industrial Processes-Fabricated Metal Products	309	POINT	191	0	99.98
Industrial Processes-Industrial Processes: NEC	2399	AREA	140	0	99.98
Internal Combustion Engines-Fugitive Emissions	2888	POINT	134	0	99.98
Petroleum and Solvent Evaporation-Petroleum Product Storage at Refineries	403	POINT	128	0	99.98
Waste Disposal-Site Remediation	504	POINT	116	0	99.98
Industrial Processes-Machinery, Miscellaneous	3129	POINT	72	0	99.98
Petroleum and Solvent Evaporation-Organic Chemical Transportation	4089	POINT	66	0	99.98
Mobile Sources-Off-highway Vehicle Diesel	2270	POINT	56	0	99.98
Industrial Processes-Electrical Equipment	313	POINT	51	0	99.98
Petroleum and Solvent Evaporation-Organic Chemical Storage	407	POINT	48	0	99.98
Petroleum and Solvent Evaporation-Printing/Publishing	405	POINT	31	0	99.98
MACT Source Categories-Miscellaneous Processes (Chemicals)	6848	POINT	20	0	99.98
Petroleum and Solvent Evaporation-	4250	POINT	9	0	99.98
MACT Source Categories : Vinyl-based Resins	6463	POINT	9	0	99.98
Industrial Processes-Transportation Equipment	314	POINT	2	0	99.98
Industrial Processes-Leather and Leather Products	3209	POINT	2	0	99.98
Internal Combustion Engines-Off-highway Diesel Engines	2700	POINT	2	0	99.98
Industrial Processes-Textile Products	330	POINT	2	0	99.98
Miscellaneous Area Sources-Agricultural Production-Crops	2801	POINT	2	0	99.98
Waste Disposal, Treatment, and Recovery-Landfills	2620	POINT	1	0	99.98
Industrial Processes-Cooling Tower	3850	POINT	0	0	99.98
MACT Source Categories : Cellulose-based Resins	644	POINT	0	0	99.98
Industrial Processes-Photo Equip/Health Care/Labs/Air Condit/SwimPools	3150	POINT	0	0	100.0
Industrial Processes-Building Construction	3110	POINT		0	100.0
Petroleum and Solvent Evaporation : Organic Chemical Transportation	4088	POINT		0	100.0
Mobile Sources-Unpaved Roads	2296	POINT		0	100.0
Mobile Sources-Paved Roads	2294	POINT		0	100.0
Petroleum and Petroleum Product Storage & Transport-Other	250	AREA		0	100.0
Solvent Utilization-Miscellaneous Non-industrial: Commercial	24610 - 24	AREA		0	100.0
MACT Source Categories-Inorganic Chemicals Manufacturing	6513	POINT		0	100.0
Solvent Utilization-Miscellaneous Non-industrial: Consumer and Commercial	24600 - 24	AREA		0	100.0
Industrial Surface Coating	2401015000	AREA		0	100.0
Architectural Coatings	2401001000	AREA		0	100.0
Gas Marketing Stage II	25010601	AREA		0	100.0
Degreasing	2415	AREA		0	100.0
Solvent Utilization-Miscellaneous Non-industrial: Consumer	2465	AREA		0	100.0
Gas Marketing Stage I	25010600	AREA		0	100.0

Category	Category Number	Sector	CO		
			Tons/Year	Percent of Total	Cumulative Percent
Graphic Arts	2425	AREA		0	100.0
Solvent Utilization-Dry Cleaning	2420	AREA		0	100.0
Solvent Utilization-Miscellaneous Industrial	2440020000	AREA		0	100.0
Auto Refinishing	2401005000	AREA		0	100.0
Waste Disposal, Treatment, and Recovery-Wastewater Treatment	2630	AREA		0	100.0
Traffic Markings	2401008000	AREA		0	100.0
Waste Disposal, Treatment, and Recovery-Landfills	2620	AREA		0	100.0
Rubber/Plastics	2430000000	AREA		0	100.0
Waste Disposal, Treatment, and Recovery-TSDFs	2640	AREA		0	100.0
Miscellaneous Area Sources-Catastrophic/Accidental Releases	2830	AREA		0	100.0
Solvent Utilization-Miscellaneous Non-industrial: Consumer	2465000000	AREA		0	100.0
Waste Disposal, Treatment, and Recovery-Leaking Underground Storage Tanks	2660	AREA		0	100.0
Mobile Sources-Aircraft	2275	AREA		0	100.0
Petroleum and Solvent Evaporation : Dry Cleaning	410	POINT		0	100.0
MACT Source Categories : Styrene or Methacrylate Based Resins	6413	POINT		0	100.0
MACT Source Categories-Miscellaneous Resins	6452	POINT		0	100.0
MACT Source Categories : Agricultural Chemicals Production	631	POINT		0	100.0
MACT Source Categories : Food and Agricultural Processes	6258	POINT		0	100.0
MACT Source Categories-Miscellaneous Processes	6828	POINT		0	100.0
MACT Source Categories-Miscellaneous Processes	6824	POINT		0	100.0
Mobile Sources-Unpaved Roads	2296	AREA		0	100.0
Industrial Processes-Construction: SIC 15-17	2311	AREA		0	100.0
Mobile Sources-Paved Roads	2294	AREA		0	100.0
Industrial Processes-Mining and Quarrying: SIC 14	2325	AREA		0	100.0
Miscellaneous Area Sources-Agricultural Production-Crops-Tilling & Harvesting	28010	AREA		0	100.0
Industrial Processes-Printing and Publishing	3600	POINT		0	100.0
MACT Source Categories : Consumer Product Manufacturing Facilities	6818	POINT		0	100.0
Miscellaneous Area Sources-Agriculture Production-Livestock-Cattle and Calves Waste Emissions	280502	AREA		0	100.0
Miscellaneous Area Sources-Agriculture Production-Livestock-Swine	2805025	AREA		0	100.0
Miscellaneous Area Sources-Agriculture Production-Livestock-Poultry	2805030	AREA		0	100.0
Miscellaneous Area Sources-Agriculture Production-Livestock-Beef Cattle	280500	AREA		0	100.0
Miscellaneous Area Sources-Domestic Animals Waste Emissions	2806	AREA		0	100.0
Miscellaneous Area Sources-Agriculture Production-Livestock-Dairy Cattle	280501	AREA		0	100.0
Miscellaneous Area Sources-Wild Animals Waste Emissions	2807	AREA		0	100.0
Miscellaneous Area Sources-Agriculture Production-Livestock-Horses and Ponies	2805035	AREA		0	100.0
Miscellaneous Area Sources-Agriculture Production-Livestock-Goats	2805045	AREA		0	100.0
Mobile Sources-Highway Vehicles-Gasoline	2201	AREA		0	100.0
Miscellaneous Area Sources-Agriculture Production-Livestock-Sheep and Lambs	2805040	AREA		0	100.0
Mobile Sources-Highway Vehicles-Diesel	2230	AREA		0	100.0
Inorganic Chemical Storage & Transport	252	AREA		0	100.0
Stationary Source Fuel Combustion-Electric Utility	2101	AREA		0	100.0
Totals for All Categories			22,438,555	100	

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Table A-4. Summary of Annual SO2 Emissions for the CENRAP Region by Category, Sector, and Pollutant

Category	Category Number	Sector	SO₂		
			Tons/Year	Percent of Total	Cumulative Percent
External Combustion Boilers-Electric Generation	1010	POINT	1,494,256	59.12	59.12
External Combustion Boilers-Industrial	1020	POINT	206,419	8.17	67.29
Stationary Source Fuel Combustion-Industrial	2102	AREA	167,312	6.62	73.91
Industrial Processes-Chemical Manufacturing	301	POINT	144,828	5.73	79.64
Industrial Processes-Petroleum Industry	306	POINT	109,937	4.35	83.99
Industrial Processes-Mineral Products	305	POINT	76,034	3.01	87
Industrial Processes-Primary Metal Production	303	POINT	67,869	2.69	89.69
Industrial Processes-Oil and Gas Production	310	POINT	30,484	1.21	90.9
Mobile Sources-Highway Vehicles-Gasoline	2201	ON-ROAD	29,525	1.17	92.07
Mobile Sources-Railroad Equipment	2285	NONROAD	21,802	0.86	92.93
Industrial Processes-Secondary Metal Production	304	POINT	21,051	0.83	93.76
Mobile Sources-Off-highway Vehicle Diesel	2270	NONROAD	20,861	0.83	94.59
Mobile Sources-Marine Vessels, Commercial	2280	NONROAD	19,342	0.77	95.36
Miscellaneous Area Sources-Agricultural Production-Crops-Field Burning	28015	AREA	19,033	0.75	96.11
Stationary Source Fuel Combustion-Commercial/Institutional	2103	AREA	18,473	0.73	96.84
Mobile Sources-Highway Vehicles-Diesel	2230	ON-ROAD	15,153	0.6	97.44
Industrial Processes-In-process Fuel Use	390	POINT	11,995	0.47	97.91
Industrial Processes-Miscellaneous Manufacturing Industries	399	POINT	8,586	0.34	98.25
Stationary Source Fuel Combustion-Residential	2104	AREA	7,063	0.28	98.53
Industrial Processes-Pulp and Paper and Wood Products	307	POINT	6,439	0.25	98.78
External Combustion Boilers-Commercial/Institutional	1030	POINT	5,781	0.23	99.01
Miscellaneous Area Sources-Other Combustion	2810	POINT	4,699	0.19	99.2
Miscellaneous Area Sources-Other Combustion	2810	AREA	4,287	0.17	99.37
Petroleum and Solvent Evaporation-Petroleum Product Storage at Refineries	403	POINT	1,589	0.06	99.43
Waste Disposal-Solid Waste Disposal-Industrial	503	POINT	1,585	0.06	99.49
Industrial Processes-Food and Agriculture	302	POINT	1,558	0.06	99.55
Mobile Sources-Aircraft	2275	NONROAD	1,511	0.06	99.61
Mobile Sources-Pleasure Craft	2282	NONROAD	1,180	0.05	99.66
Internal Combustion Engines-Industrial	2020	POINT	1,176	0.05	99.71
Waste Disposal-Solid Waste Disposal-Government	501	POINT	1,164	0.05	99.76
Internal Combustion Engines-Electric Generation	2010	POINT	994	0.04	99.8
Open Burning-Waste Disposal, Treatment, and Recovery	261	AREA	821	0.03	99.83
Petroleum and Solvent Evaporation-Organic Solvent Evaporation	401	POINT	749	0.03	99.86
Mobile Sources-Off-highway Vehicle Gasoline, 4-Stroke	2265	NONROAD	711	0.03	99.89
Waste Disposal, Treatment, and Recovery-On-site Incineration	2601	AREA	680	0.03	99.92
Waste Disposal-Site Remediation	504	POINT	635	0.03	99.95
Mobile Sources-Off-highway Vehicle Gasoline, 2-Stroke	2260	NONROAD	328	0.01	99.96
Industrial Processes-Industrial Processes: NEC	2399	AREA	307	0.01	99.97
Petroleum and Solvent Evaporation-Transportation and Marketing of Petroleum Products	406	POINT	204	0.01	99.98
Mobile Sources-Aircraft	2275	POINT	183	0.01	99.99
Bulk Materials Transport & Transport	253	AREA	172	0.01	100.0
Internal Combustion Engines-Commercial/Institutional	2030	POINT	151	0.01	100.0
Miscellaneous Area Sources-Prescribed Rangeland Burning	2810020	AREA	99	0	100.0
Mobile Sources-LPG	2267	NONROAD	71	0	100.0
Petroleum and Solvent Evaporation-Organic Chemical Storage	407	POINT	62	0	100.0
Internal Combustion Engines-Engine Testing	2040	POINT	53	0	100.0
Industrial Processes-Fabricated Metal Products	309	POINT	52	0	100.0

Category	Category Number	Sector	SO₂		
			Tons/Year	Percent of Total	Cumulative Percent
Waste Disposal-Solid Waste Disposal-Commercial/Institutional	502	POINT	48	0	100.0
Miscellaneous Area Sources-Prescribed Rangeland Burning	2810020	POINT	47	0	100.0
Mobile Sources-Off-highway Vehicle Diesel	2270	POINT	30	0	100.0
Petroleum and Solvent Evaporation-Surface Coating Operations	402	POINT	13	0	100.0
Miscellaneous Area Sources-Aircraft/Rocket Engine Firing and Testing	2810040	AREA	13	0	100.0
External Combustion Boilers-Space Heaters	1050	POINT	12	0	100.0
Industrial Processes-Electrical Equipment	313	POINT	9	0	100.0
Mobile Sources-CNG	2268	NONROAD	7	0	100.0
Petroleum and Solvent Evaporation-Organic Chemical Transportation	4089	POINT	5	0	100.0
Mobile Sources-Off-highway Vehicle Gasoline, 4-Stroke	2265	POINT	5	0	100.0
Industrial Processes-Transportation Equipment	314	POINT	4	0	100.0
Industrial Processes-Rubber and Miscellaneous Plastics Products	308	POINT	4	0	100.0
Industrial Processes-Machinery, Miscellaneous	3129	POINT	3	0	100.0
Petroleum and Solvent Evaporation-Petroleum Liquids Storage (non-Refinery)	4040	POINT	1	0	100.0
Petroleum and Solvent Evaporation-Printing/Publishing	405	POINT	1	0	100.0
Internal Combustion Engines-Fugitive Emissions	2888	POINT	1	0	100.0
Miscellaneous Area Sources-Agricultural Production-Crops	2801	POINT	0	0	100.0
MACT Source Categories : Vinyl-based Resins	6463	POINT	0	0	100.0
Industrial Processes-Cooling Tower	3850	POINT	0	0	100.0
Petroleum and Solvent Evaporation-	4250	POINT	0	0	100.0
MACT Source Categories : Cellulose-based Resins	644	POINT	0	0	100.0
Internal Combustion Engines-Off-highway Diesel Engines	2700	POINT		0	100.0
Industrial Processes-Textile Products	330	POINT		0	100.0
Industrial Processes-Photo Equip/Health Care/Labs/Air Condit/SwimPools	3150	POINT		0	100.0
Industrial Processes-Building Construction	3110	POINT		0	100.0
Petroleum and Solvent Evaporation : Organic Chemical Transportation	4088	POINT		0	100.0
Industrial Processes-Oil and Gas Production: SIC 13	2310	AREA		0	100.0
Miscellaneous Area Sources-Agricultural Production-Crops	2801	AREA		0	100.0
Industrial Processes-Food and Kindred Products: SIC 20	2302	AREA		0	100.0
MACT Source Categories-Miscellaneous Processes (Chemicals)	6848	POINT		0	100.0
Industrial Processes-Leather and Leather Products	3209	POINT		0	100.0
Waste Disposal, Treatment, and Recovery-Landfills	2620	POINT		0	100.0
Mobile Sources-Unpaved Roads	2296	POINT		0	100.0
Mobile Sources-Paved Roads	2294	POINT		0	100.0
Petroleum and Petroleum Product Storage & Transport-Other	250	AREA		0	100.0
Solvent Utilization-Miscellaneous Non-industrial: Commercial	24610 - 24	AREA		0	100.0
MACT Source Categories-Inorganic Chemicals Manufacturing	6513	POINT		0	100.0
Solvent Utilization-Miscellaneous Non-industrial: Consumer and Commercial	24600 - 24	AREA		0	100.0
Industrial Surface Coating	2401015000	AREA		0	100.0
Architectural Coatings	2401001000	AREA		0	100.0
Gas Marketing Stage II	25010601	AREA		0	100.0
Degreasing	2415	AREA		0	100.0
Solvent Utilization-Miscellaneous Non-industrial: Consumer	2465	AREA		0	100.0
Gas Marketing Stage I	25010600	AREA		0	100.0

Category	Category Number	Sector	SO₂		
			Tons/Year	Percent of Total	Cumulative Percent
Graphic Arts	2425	AREA		0	100.0
Solvent Utilization-Dry Cleaning	2420	AREA		0	100.0
Solvent Utilization-Miscellaneous Industrial	2440020000	AREA		0	100.0
Auto Refinishing	2401005000	AREA		0	100.0
Waste Disposal, Treatment, and Recovery-Wastewater Treatment	2630	AREA		0	100.0
Traffic Markings	2401008000	AREA		0	100.0
Waste Disposal, Treatment, and Recovery-Landfills	2620	AREA		0	100.0
Rubber/Plastics	2430000000	AREA		0	100.0
Waste Disposal, Treatment, and Recovery-TSDFs	2640	AREA		0	100.0
Miscellaneous Area Sources-Catastrophic/Accidental Releases	2830	AREA		0	100.0
Solvent Utilization-Miscellaneous Non-industrial: Consumer	2465000000	AREA		0	100.0
Waste Disposal, Treatment, and Recovery-Leaking Underground Storage Tanks	2660	AREA		0	100.0
Mobile Sources-Aircraft	2275	AREA		0	100.0
Petroleum and Solvent Evaporation : Dry Cleaning	410	POINT		0	100.0
MACT Source Categories : Styrene or Methacrylate Based Resins	6413	POINT		0	100.0
MACT Source Categories-Miscellaneous Resins	6452	POINT		0	100.0
MACT Source Categories : Agricultural Chemicals Production	631	POINT		0	100.0
MACT Source Categories : Food and Agricultural Processes	6258	POINT		0	100.0
MACT Source Categories-Miscellaneous Processes	6828	POINT		0	100.0
MACT Source Categories-Miscellaneous Processes	6824	POINT		0	100.0
Mobile Sources-Unpaved Roads	2296	AREA		0	100.0
Industrial Processes-Construction: SIC 15-17	2311	AREA		0	100.0
Mobile Sources-Paved Roads	2294	AREA		0	100.0
Industrial Processes-Mining and Quarrying: SIC 14	2325	AREA		0	100.0
Miscellaneous Area Sources-Agricultural Production-Crops-Tilling & Harvesting	28010	AREA		0	100.0
Industrial Processes-Printing and Publishing	3600	POINT		0	100.0
MACT Source Categories : Consumer Product Manufacturing Facilities	6818	POINT		0	100.0
Miscellaneous Area Sources-Agriculture Production-Livestock-Cattle and Calves Waste Emissions	280502	AREA		0	100.0
Miscellaneous Area Sources-Agriculture Production-Livestock-Swine	2805025	AREA		0	100.0
Miscellaneous Area Sources-Agriculture Production-Livestock-Poultry	2805030	AREA		0	100.0
Miscellaneous Area Sources-Agriculture Production-Livestock-Beef Cattle	280500	AREA		0	100.0
Miscellaneous Area Sources-Domestic Animals Waste Emissions	2806	AREA		0	100.0
Miscellaneous Area Sources-Agriculture Production-Livestock-Dairy Cattle	280501	AREA		0	100.0
Miscellaneous Area Sources-Wild Animals Waste Emissions	2807	AREA		0	100.0
Miscellaneous Area Sources-Agriculture Production-Livestock-Horses and Ponies	2805035	AREA		0	100.0
Miscellaneous Area Sources-Agriculture Production-Livestock-Goats	2805045	AREA		0	100.0
Mobile Sources-Highway Vehicles-Gasoline	2201	AREA		0	100.0
Miscellaneous Area Sources-Agriculture Production-Livestock-Sheep and Lambs	2805040	AREA		0	100.0
Mobile Sources-Highway Vehicles-Diesel	2230	AREA		0	100.0
Inorganic Chemical Storage & Transport	252	AREA		0	100.0
Stationary Source Fuel Combustion-Electric Utility	2101	AREA		0	100.0
Totals for All Categories			2,527,461	100	

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Table A-5. Summary of Annual PM10-PRI and PM25-PRI Emissions for the CENRAP Region by Category, Sector, and Pollutant

Category	Category Number	Sector	PM10-PRI			PM25-PRI		
			Tons/Year	Percent of Total	Cumulative Percent	Tons/Year	Percent of Total	Cumulative Percent
Mobile Sources-Unpaved Roads	2296	AREA	3,882,376	52.16	52.16	580,684	31.52	31.52
Miscellaneous Area Sources-Agricultural Production-Crops	2801	AREA	1,296,636	17.42	69.58	264,667	14.36	45.88
Industrial Processes-Construction: SIC 15-17	2311	AREA	514,614	6.91	76.49	102,936	5.59	51.47
Mobile Sources-Paved Roads	2294	AREA	474,749	6.38	82.87	76,386	4.15	55.62
Miscellaneous Area Sources-Agricultural Production-Crops-Field Burning	28015	AREA	177,533	2.39	85.26	141,020	7.65	63.27
Industrial Processes-Mining and Quarrying: SIC 14	2325	AREA	175,633	2.36	87.62	35,123	1.91	65.18
Miscellaneous Area Sources-Other Combustion	2810	AREA	112,081	1.51	89.13	99,695	5.41	70.59
Miscellaneous Area Sources-Agriculture Production-Livestock-Beef Cattle	280500	AREA	96,895	1.3	90.43	14,534	0.79	71.38
Miscellaneous Area Sources-Other Combustion	2810	POINT	77,277	1.04	91.47	65,532	3.56	74.94
External Combustion Boilers-Electric Generation	1010	POINT	72,073	0.97	92.44	47,444	2.57	77.51
Industrial Processes-Food and Agriculture	302	POINT	61,143	0.82	93.26	11,534	0.63	78.14
Stationary Source Fuel Combustion-Residential	2104	AREA	56,646	0.76	94.02	56,465	3.06	81.2
Open Burning-Waste Disposal, Treatment, and Recovery	261	AREA	53,903	0.72	94.74	51,277	2.78	83.98
External Combustion Boilers-Industrial	1020	POINT	48,724	0.65	95.39	41,768	2.27	86.25
Mobile Sources-Off-highway Vehicle Diesel	2270	NONROAD	43,537	0.58	95.97	40,617	2.2	88.45
Industrial Processes-Mineral Products	305	POINT	36,258	0.49	96.46	14,499	0.79	89.24
Miscellaneous Area Sources-Prescribed Rangeland Burning	2810020	AREA	32,949	0.44	96.9	27,910	1.51	90.75
Mobile Sources-Pleasure Craft	2282	NONROAD	26,735	0.36	97.26	24,696	1.34	92.09
Stationary Source Fuel Combustion-Industrial	2102	AREA	19,639	0.26	97.52	12,136	0.66	92.75
Mobile Sources-Highway Vehicles-Diesel	2230	ON-ROAD	19,429	0.26	97.78	16,766	0.91	93.66
Industrial Processes-Chemical Manufacturing	301	POINT	16,165	0.22	98	11,402	0.62	94.28
Industrial Processes-Food and Kindred Products: SIC 20	2302	AREA	15,078	0.2	98.2	14,041	0.76	95.04
Industrial Processes-Primary Metal Production	303	POINT	13,927	0.19	98.39	3,318	0.18	95.22
Mobile Sources-Highway Vehicles-Gasoline	2201	ON-ROAD	13,637	0.18	98.57	6,763	0.37	95.59
Internal Combustion Engines-Industrial	2020	POINT	13,364	0.18	98.75	13,054	0.71	96.3
Industrial Processes-Pulp and Paper and Wood Products	307	POINT	13,155	0.18	98.93	7,724	0.42	96.72
Industrial Processes-Petroleum Industry	306	POINT	12,654	0.17	99.1	10,403	0.56	97.28
Mobile Sources-Railroad Equipment	2285	NONROAD	8,989	0.12	99.22	8,108	0.44	97.72
Mobile Sources-Off-highway Vehicle Gasoline, 2-Stroke	2260	NONROAD	7,247	0.1	99.32	6,699	0.36	98.08
Stationary Source Fuel Combustion-Commercial/Institutional	2103	AREA	6,923	0.09	99.41	6,529	0.35	98.43

Category	Category Number	Sector	PM10-PRI			PM25-PRI		
			Tons/Year	Percent of Total	Cumulative Percent	Tons/Year	Percent of Total	Cumulative Percent
Industrial Processes-Cooling Tower	3850	POINT	6,403	0.09	99.5	5,470	0.3	98.73
Industrial Processes-Secondary Metal Production	304	POINT	6,101	0.08	99.58	3,787	0.21	98.94
Miscellaneous Area Sources-Agricultural Production-Crops-Tilling & Harvesting	28010	AREA	3,465	0.05	99.63	92	0	98.94
Industrial Processes-Miscellaneous Manufacturing Industries	399	POINT	3,310	0.04	99.67	1,921	0.1	99.04
Industrial Processes-In-process Fuel Use	390	POINT	3,264	0.04	99.71	1,187	0.06	99.1
Internal Combustion Engines-Electric Generation	2010	POINT	3,262	0.04	99.75	3,176	0.17	99.27
Mobile Sources-Marine Vessels, Commercial	2280	NONROAD	2,798	0.04	99.79	2,574	0.14	99.41
Industrial Processes-Industrial Processes: NEC	2399	AREA	2,637	0.04	99.83	1,827	0.1	99.51
External Combustion Boilers-Commercial/Institutional	1030	POINT	1,587	0.02	99.85	1,183	0.06	99.57
Petroleum and Solvent Evaporation-Surface Coating Operations	402	POINT	1,454	0.02	99.87	1,200	0.07	99.64
Industrial Processes-Fabricated Metal Products	309	POINT	1,254	0.02	99.89	501	0.03	99.67
Waste Disposal-Solid Waste Disposal-Government	501	POINT	976	0.01	99.9	508	0.03	99.7
Waste Disposal, Treatment, and Recovery-On-site Incineration	2601	AREA	854	0.01	99.91	609	0.03	99.73
Mobile Sources-Off-highway Vehicle Gasoline, 4-Stroke	2265	NONROAD	753	0.01	99.92	703	0.04	99.77
Industrial Processes-Rubber and Miscellaneous Plastics Products	308	POINT	636	0.01	99.93	264	0.01	99.78
Petroleum and Solvent Evaporation-Petroleum Product Storage at Refineries	403	POINT	568	0.01	99.94	471	0.03	99.81
Mobile Sources-Aircraft	2275	NONROAD	441	0.01	99.95	349	0.02	99.83
Industrial Processes-Oil and Gas Production	310	POINT	440	0.01	99.96	419	0.02	99.85
Waste Disposal-Solid Waste Disposal-Industrial	503	POINT	436	0.01	99.97	301	0.02	99.87
Petroleum and Petroleum Product Storage & Transport-Other	250	AREA	387	0.01	99.98	387	0.02	99.89
Waste Disposal-Solid Waste Disposal-Commercial/Institutional	502	POINT	276	0	99.98	174	0.01	99.9
Internal Combustion Engines-Commercial/Institutional	2030	POINT	220	0	99.98	219	0.01	99.91
Mobile Sources-LPG	2267	NONROAD	192	0	99.98	190	0.01	99.92
Petroleum and Solvent Evaporation-Organic Solvent Evaporation	401	POINT	185	0	99.98	151	0.01	99.93
Mobile Sources-Aircraft	2275	POINT	160	0	99.98	113	0.01	99.94
Miscellaneous Area Sources-Prescribed Rangeland Burning	2810020	POINT	158	0	99.98	126	0.01	99.95
Miscellaneous Area Sources-Catastrophic/Accidental Releases	2830	AREA	131	0	99.98	131	0.01	99.96
MACT Source Categories : Vinyl-based Resins	6463	POINT	118	0	99.98	77	0	99.96
Waste Disposal-Site Remediation	504	POINT	102	0	99.98	65	0	99.96
Solvent Utilization-Miscellaneous Non-industrial: Commercial	24610 - 24	AREA	91	0	99.98	91	0	99.96
Internal Combustion Engines-Fugitive Emissions	2888	POINT	84	0	99.98	80	0	99.96
Industrial Processes-Machinery, Miscellaneous	3129	POINT	64	0	99.98	54	0	99.96

Category	Category Number	Sector	PM10-PRI			PM25-PRI		
			Tons/Year	Percent of Total	Cumulative Percent	Tons/Year	Percent of Total	Cumulative Percent
Internal Combustion Engines-Engine Testing	2040	POINT	60	0	99.98	54	0	99.96
Bulk Materials Transport & Transport	253	AREA	56	0	99.98	56	0	99.96
Petroleum and Solvent Evaporation-Organic Chemical Storage	407	POINT	53	0	99.98	44	0	99.96
Industrial Processes-Transportation Equipment	314	POINT	51	0	99.98	31	0	99.96
Petroleum and Solvent Evaporation-Printing/Publishing	405	POINT	41	0	99.98	34	0	99.96
External Combustion Boilers-Space Heaters	1050	POINT	36	0	99.98	35	0	99.96
Petroleum and Solvent Evaporation-Transportation and Marketing of Petroleum Products	406	POINT	30	0	99.98	25	0	99.96
Mobile Sources-CNG	2268	NONROAD	28	0	99.98	27	0	99.96
Miscellaneous Area Sources-Agriculture Production-Livestock-Dairy Cattle	280501	AREA	26	0	99.98	3	0	99.96
Industrial Processes-Electrical Equipment	313	POINT	23	0	99.98	21	0	99.96
Mobile Sources-Unpaved Roads	2296	POINT	21	0	99.98	21	0	99.96
Mobile Sources-Off-highway Vehicle Diesel	2270	POINT	12	0	99.98	11	0	99.96
Industrial Processes-Leather and Leather Products	3209	POINT	6	0	99.98	1	0	99.96
Industrial Processes-Building Construction	3110	POINT	5	0	99.98	1	0	99.96
MACT Source Categories-Miscellaneous Processes	6824	POINT	4	0	99.98	1	0	99.96
Petroleum and Solvent Evaporation-Organic Chemical Transportation	4089	POINT	3	0	99.98	2	0	99.96
Petroleum and Solvent Evaporation-Petroleum Liquids Storage (non-Refinery)	4040	POINT	2	0	99.98	2	0	99.96
MACT Source Categories : Styrene or Methacrylate Based Resins	6413	POINT	2	0	99.98	1	0	99.96
Industrial Processes-Textile Products	330	POINT	2	0	99.98	2	0	99.96
Mobile Sources-Off-highway Vehicle Gasoline, 4-Stroke	2265	POINT	2	0	99.98	2	0	99.96
Mobile Sources-Paved Roads	2294	POINT	1	0	99.98	1	0	99.96
Miscellaneous Area Sources-Agricultural Production-Crops	2801	POINT	1	0	99.98	1	0	99.96
Miscellaneous Area Sources-Aircraft/Rocket Engine Firing and Testing	2810040	AREA	1	0	99.98	0	0	99.96
MACT Source Categories : Agricultural Chemicals Production	631	POINT	0	0	100.0	0	0	99.96
Industrial Processes-Printing and Publishing	3600	POINT	0	0	100.0	0	0	99.96
Industrial Processes-Photo Equip/Health Care/Labs/Air Condit/SwimPools	3150	POINT	0	0	100.0	0	0	99.96
Petroleum and Solvent Evaporation-	4250	POINT	0	0	100.0	0	0	99.96
Petroleum and Solvent Evaporation : Organic Chemical Transportation	4088	POINT	0	0	100.0	0	0	100.0
Waste Disposal, Treatment, and Recovery-Landfills	2620	POINT		0	100.0		0	100.0

Category	Category Number	Sector	PM10-PRI			PM25-PRI		
			Tons/Year	Percent of Total	Cumulative Percent	Tons/Year	Percent of Total	Cumulative Percent
MACT Source Categories : Cellulose-based Resins	644	POINT		0	100.0		0	100.0
Internal Combustion Engines-Off-highway Diesel Engines	2700	POINT		0	100.0		0	100.0
MACT Source Categories-Miscellaneous Processes (Chemicals)	6848	POINT		0	100.0		0	100.0
MACT Source Categories-Inorganic Chemicals Manufacturing	6513	POINT		0	100.0		0	100.0
MACT Source Categories-Miscellaneous Resins	6452	POINT		0	100.0		0	100.0
MACT Source Categories : Food and Agricultural Processes	6258	POINT		0	100.0		0	100.0
MACT Source Categories-Miscellaneous Processes	6828	POINT		0	100.0		0	100.0
MACT Source Categories : Consumer Product Manufacturing Facilities	6818	POINT		0	100.0		0	100.0
Miscellaneous Area Sources-Agriculture Production-Livestock-Cattle and Calves Waste Emissions	280502	AREA		0	100.0		0	100.0
Miscellaneous Area Sources-Agriculture Production-Livestock-Swine	2805025	AREA		0	100.0		0	100.0
Miscellaneous Area Sources-Agriculture Production-Livestock-Poultry	2805030	AREA		0	100.0		0	100.0
Miscellaneous Area Sources-Domestic Animals Waste Emissions	2806	AREA		0	100.0		0	100.0
Miscellaneous Area Sources-Wild Animals Waste Emissions	2807	AREA		0	100.0		0	100.0
Miscellaneous Area Sources-Agriculture Production-Livestock-Horses and Ponies	2805035	AREA		0	100.0		0	100.0
Miscellaneous Area Sources-Agriculture Production-Livestock-Goats	2805045	AREA		0	100.0		0	100.0
Mobile Sources-Highway Vehicles-Gasoline	2201	AREA		0	100.0		0	100.0
Miscellaneous Area Sources-Agriculture Production-Livestock-Sheep and Lambs	2805040	AREA		0	100.0		0	100.0
Waste Disposal, Treatment, and Recovery-Wastewater Treatment	2630	AREA		0	100.0		0	100.0
Waste Disposal, Treatment, and Recovery-Landfills	2620	AREA		0	100.0		0	100.0
Mobile Sources-Highway Vehicles-Diesel	2230	AREA		0	100.0		0	100.0
Inorganic Chemical Storage & Transport	252	AREA		0	100.0		0	100.0
Stationary Source Fuel Combustion-Electric Utility	2101	AREA		0	100.0		0	100.0
Industrial Processes-Oil and Gas Production: SIC 13	2310	AREA		0	100.0		0	100.0
Solvent Utilization-Miscellaneous Non-industrial: Consumer and Commercial	24600 - 24	AREA		0	100.0		0	100.0
Industrial Surface Coating	2401015000	AREA		0	100.0		0	100.0
Architectural Coatings	2401001000	AREA		0	100.0		0	100.0
Gas Marketing Stage II	25010601	AREA		0	100.0		0	100.0
Degreasing	2415	AREA		0	100.0		0	100.0

Category	Category Number	Sector	PM10-PRI			PM25-PRI		
			Tons/Year	Percent of Total	Cumulative Percent	Tons/Year	Percent of Total	Cumulative Percent
Solvent Utilization-Miscellaneous Non-industrial: Consumer	2465	AREA		0	100.0		0	100.0
Gas Marketing Stage I	25010600	AREA		0	100.0		0	100.0
Graphic Arts	2425	AREA		0	100.0		0	100.0
Solvent Utilization-Dry Cleaning	2420	AREA		0	100.0		0	100.0
Solvent Utilization-Miscellaneous Industrial	2440020000	AREA		0	100.0		0	100.0
Auto Refinishing	2401005000	AREA		0	100.0		0	100.0
Traffic Markings	2401008000	AREA		0	100.0		0	100.0
Rubber/Plastics	2430000000	AREA		0	100.0		0	100.0
Waste Disposal, Treatment, and Recovery-TSDFs	2640	AREA		0	100.0		0	100.0
Solvent Utilization-Miscellaneous Non-industrial: Consumer	2465000000	AREA		0	100.0		0	100.0
Waste Disposal, Treatment, and Recovery-Leaking Underground Storage Tanks	2660	AREA		0	100.0		0	100.0
Mobile Sources-Aircraft	2275	AREA		0	100.0		0	100.0
Petroleum and Solvent Evaporation : Dry Cleaning	410	POINT		0	100.0		0	100.0
Totals for All Categories			7,443,244	100		1,842,509	100	

Table A-6. Summary of Annual NH3 Emissions for the CENRAP Region by Category, Sector, and Pollutant

Category	Category Number	Sector	NH3		
			Tons/Year	Percent of Total	Cumulative Percent
Miscellaneous Area Sources-Agricultural Production-Crops	2801	AREA	564,046	32.88	32.88
Miscellaneous Area Sources-Agriculture Production-Livestock-Cattle and Calves Waste Emissions	280502	AREA	243,489	14.19	47.07
Miscellaneous Area Sources-Agriculture Production-Livestock-Swine	2805025	AREA	187,598	10.93	58
Industrial Processes-Food and Agriculture	302	POINT	157,951	9.21	67.21
Miscellaneous Area Sources-Agriculture Production-Livestock-Poultry	2805030	AREA	138,222	8.06	75.27
Miscellaneous Area Sources-Agriculture Production-Livestock-Beef Cattle	280500	AREA	118,941	6.93	82.2
Mobile Sources-Highway Vehicles-Gasoline	2201	ON-ROAD	46,621	2.72	84.92
Industrial Processes-Industrial Processes: NEC	2399	AREA	33,960	1.98	86.9
Miscellaneous Area Sources-Domestic Animals Waste Emissions	2806	AREA	33,663	1.96	88.86
Miscellaneous Area Sources-Other Combustion	2810	AREA	32,201	1.88	90.74
Miscellaneous Area Sources-Agriculture Production-Livestock-Dairy Cattle	280501	AREA	22,407	1.31	92.05
Miscellaneous Area Sources-Agricultural Production-Crops-Field Burning	28015	AREA	20,511	1.2	93.25
Miscellaneous Area Sources-Wild Animals Waste Emissions	2807	AREA	19,428	1.13	94.38
Industrial Processes-Chemical Manufacturing	301	POINT	14,199	0.83	95.21
Industrial Processes-Food and Kindred Products: SIC 20	2302	AREA	12,727	0.74	95.95
Miscellaneous Area Sources-Agriculture Production-Livestock-Horses and Ponies	2805035	AREA	10,750	0.63	96.58
Miscellaneous Area Sources-Agriculture Production-Livestock-Goats	2805045	AREA	8,483	0.49	97.07
Mobile Sources-Highway Vehicles-Gasoline	2201	AREA	8,295	0.48	97.55
Miscellaneous Area Sources-Other Combustion	2810	POINT	7,907	0.46	98.01
Waste Disposal-Solid Waste Disposal-Commercial/Institutional	502	POINT	4,521	0.26	98.27
Miscellaneous Area Sources-Agriculture Production-Livestock-Sheep and Lambs	2805040	AREA	4,247	0.25	98.52
External Combustion Boilers-Electric Generation	1010	POINT	4,126	0.24	98.76
External Combustion Boilers-Space Heaters	1050	POINT	3,752	0.22	98.98
Miscellaneous Area Sources-Prescribed Rangeland Burning	2810020	AREA	3,343	0.19	99.17
Waste Disposal, Treatment, and Recovery-Wastewater Treatment	2630	AREA	3,211	0.19	99.36
Stationary Source Fuel Combustion-Industrial	2102	AREA	1,824	0.11	99.47
Mobile Sources-Highway Vehicles-Diesel	2230	ON-ROAD	1,249	0.07	99.54
Industrial Processes-Pulp and Paper and Wood Products	307	POINT	1,188	0.07	99.61
Industrial Processes-Petroleum Industry	306	POINT	1,062	0.06	99.67
Waste Disposal-Solid Waste Disposal-Government	501	POINT	974	0.06	99.73
Mobile Sources-CNG	2268	NONROAD	838	0.05	99.78
Waste Disposal, Treatment, and Recovery-Landfills	2620	AREA	587	0.03	99.81
Industrial Processes-Primary Metal Production	303	POINT	539	0.03	99.84
Mobile Sources-Highway Vehicles-Diesel	2230	AREA	443	0.03	99.87
External Combustion Boilers-Industrial	1020	POINT	376	0.02	99.89
Internal Combustion Engines-Electric Generation	2010	POINT	323	0.02	99.91
Stationary Source Fuel Combustion-Commercial/Institutional	2103	AREA	258	0.02	99.93
Industrial Processes-Mineral Products	305	POINT	215	0.01	99.94
External Combustion Boilers-Commercial/Institutional	1030	POINT	197	0.01	99.95
Mobile Sources-Off-highway Vehicle Diesel	2270	NONROAD	168	0.01	99.96
Mobile Sources-Railroad Equipment	2285	NONROAD	147	0.01	99.97

Category	Category Number	Sector	NH$_3$		
			Tons/Year	Percent of Total	Cumulative Percent
Petroleum and Solvent Evaporation-Organic Chemical Storage	407	POINT	126	0.01	99.98
Mobile Sources-Pleasure Craft	2282	NONROAD	96	0.01	99.99
Waste Disposal-Solid Waste Disposal-Industrial	503	POINT	93	0.01	100.0
Stationary Source Fuel Combustion-Residential	2104	AREA	86	0	100.0
Internal Combustion Engines-Industrial	2020	POINT	77	0	100.0
Waste Disposal, Treatment, and Recovery-Landfills	2620	POINT	36	0	100.0
Petroleum and Solvent Evaporation-Petroleum Product Storage at Refineries	403	POINT	33	0	100.0
Mobile Sources-Off-highway Vehicle Gasoline, 4-Stroke	2265	NONROAD	32	0	100.0
Mobile Sources-Marine Vessels, Commercial	2280	NONROAD	28	0	100.0
Mobile Sources-Off-highway Vehicle Gasoline, 2-Stroke	2260	NONROAD	25	0	100.0
Inorganic Chemical Storage & Transport	252	AREA	22	0	100.0
Industrial Processes-Miscellaneous Manufacturing Industries	399	POINT	19	0	100.0
Petroleum and Solvent Evaporation-Organic Solvent Evaporation	401	POINT	17	0	100.0
Miscellaneous Area Sources-Prescribed Rangeland Burning	2810020	POINT	16	0	100.0
Industrial Processes-Rubber and Miscellaneous Plastics Products	308	POINT	14	0	100.0
Industrial Processes-Secondary Metal Production	304	POINT	4	0	100.0
Petroleum and Solvent Evaporation-Surface Coating Operations	402	POINT	3	0	100.0
Industrial Processes-In-process Fuel Use	390	POINT	2	0	100.0
MACT Source Categories : Vinyl-based Resins	6463	POINT	1	0	100.0
Stationary Source Fuel Combustion-Electric Utility	2101	AREA	1	0	100.0
Industrial Processes-Oil and Gas Production	310	POINT	0	0	100.0
Mobile Sources-Aircraft	2275	NONROAD	0	0	100.0
Petroleum and Solvent Evaporation-Organic Chemical Transportation	4089	POINT	0	0	100.0
Petroleum and Solvent Evaporation-Transportation and Marketing of Petroleum Products	406	POINT	0	0	100.0
Industrial Processes-Fabricated Metal Products	309	POINT	0	0	100.0
Industrial Processes-Electrical Equipment	313	POINT	0	0	100.0
Petroleum and Solvent Evaporation-Printing/Publishing	405	POINT	0	0	100.0
Industrial Processes-Leather and Leather Products	3209	POINT	0	0	100.0
Internal Combustion Engines-Engine Testing	2040	POINT	0	0	100.0
Internal Combustion Engines-Commercial/Institutional	2030	POINT	0	0	100.0
Miscellaneous Area Sources-Agricultural Production-Crops	2801	POINT	0	0	100.0
Internal Combustion Engines-Fugitive Emissions	2888	POINT		0	100.0
Industrial Processes-Photo Equip/Health Care/Labs/Air Condit/SwimPools	3150	POINT		0	100.0
Open Burning-Waste Disposal, Treatment, and Recovery	261	AREA		0	100.0
Waste Disposal, Treatment, and Recovery-On-site Incineration	2601	AREA		0	100.0
Waste Disposal-Site Remediation	504	POINT		0	100.0
Mobile Sources-Aircraft	2275	POINT		0	100.0
Bulk Materials Transport & Transport	253	AREA		0	100.0
Mobile Sources-LPG	2267	NONROAD		0	100.0
Mobile Sources-Off-highway Vehicle Diesel	2270	POINT		0	100.0
Miscellaneous Area Sources-Aircraft/Rocket Engine Firing and Testing	2810040	AREA		0	100.0
Mobile Sources-Off-highway Vehicle Gasoline, 4-Stroke	2265	POINT		0	100.0
Industrial Processes-Transportation Equipment	314	POINT		0	100.0
Industrial Processes-Machinery, Miscellaneous	3129	POINT		0	100.0
Petroleum and Solvent Evaporation-Petroleum Liquids Storage (non-Refinery)	4040	POINT		0	100.0
Industrial Processes-Cooling Tower	3850	POINT		0	100.0

Category	Category Number	Sector	NH$_3$		
			Tons/Year	Percent of Total	Cumulative Percent
Petroleum and Solvent Evaporation-	4250	POINT		0	100.0
MACT Source Categories : Cellulose-based Resins	644	POINT		0	100.0
Internal Combustion Engines-Off-highway Diesel Engines	2700	POINT		0	100.0
Industrial Processes-Textile Products	330	POINT		0	100.0
Industrial Processes-Building Construction	3110	POINT		0	100.0
Petroleum and Solvent Evaporation : Organic Chemical Transportation	4088	POINT		0	100.0
Industrial Processes-Oil and Gas Production: SIC 13	2310	AREA		0	100.0
MACT Source Categories-Miscellaneous Processes (Chemicals)	6848	POINT		0	100.0
Mobile Sources-Unpaved Roads	2296	POINT		0	100.0
Mobile Sources-Paved Roads	2294	POINT		0	100.0
Petroleum and Petroleum Product Storage & Transport-Other	250	AREA		0	100.0
Solvent Utilization-Miscellaneous Non-industrial: Commercial	24610 - 24	AREA		0	100.0
MACT Source Categories-Inorganic Chemicals Manufacturing	6513	POINT		0	100.0
Solvent Utilization-Miscellaneous Non-industrial: Consumer and Commercial	24600 - 24	AREA		0	100.0
Industrial Surface Coating	2401015000	AREA		0	100.0
Architectural Coatings	2401001000	AREA		0	100.0
Gas Marketing Stage II	25010601	AREA		0	100.0
Degreasing	2415	AREA		0	100.0
Solvent Utilization-Miscellaneous Non-industrial: Consumer	2465	AREA		0	100.0
Gas Marketing Stage I	25010600	AREA		0	100.0
Graphic Arts	2425	AREA		0	100.0
Solvent Utilization-Dry Cleaning	2420	AREA		0	100.0
Solvent Utilization-Miscellaneous Industrial	2440020000	AREA		0	100.0
Auto Refinishing	2401005000	AREA		0	100.0
Traffic Markings	2401008000	AREA		0	100.0
Rubber/Plastics	2430000000	AREA		0	100.0
Waste Disposal, Treatment, and Recovery-TSDFs	2640	AREA		0	100.0
Miscellaneous Area Sources-Catastrophic/Accidental Releases	2830	AREA		0	100.0
Solvent Utilization-Miscellaneous Non-industrial: Consumer	2465000000	AREA		0	100.0
Waste Disposal, Treatment, and Recovery-Leaking Underground Storage Tanks	2660	AREA		0	100.0
Mobile Sources-Aircraft	2275	AREA		0	100.0
Petroleum and Solvent Evaporation : Dry Cleaning	410	POINT		0	100.0
MACT Source Categories : Styrene or Methacrylate Based Resins	6413	POINT		0	100.0
MACT Source Categories-Miscellaneous Resins	6452	POINT		0	100.0
MACT Source Categories : Agricultural Chemicals Production	631	POINT		0	100.0
MACT Source Categories : Food and Agricultural Processes	6258	POINT		0	100.0
MACT Source Categories-Miscellaneous Processes	6828	POINT		0	100.0
MACT Source Categories-Miscellaneous Processes	6824	POINT		0	100.0
Mobile Sources-Unpaved Roads	2296	AREA		0	100.0
Industrial Processes-Construction: SIC 15-17	2311	AREA		0	100.0
Mobile Sources-Paved Roads	2294	AREA		0	100.0
Industrial Processes-Mining and Quarrying: SIC 14	2325	AREA		0	100.0
Miscellaneous Area Sources-Agricultural Production-Crops-Tilling & Harvesting	28010	AREA		0	100.0
Industrial Processes-Printing and Publishing	3600	POINT		0	100.0
MACT Source Categories : Consumer Product Manufacturing Facilities	6818	POINT		0	100.0
Totals for All Categories			1,715,717	100	

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